NOV MBER

Farm Chemicals

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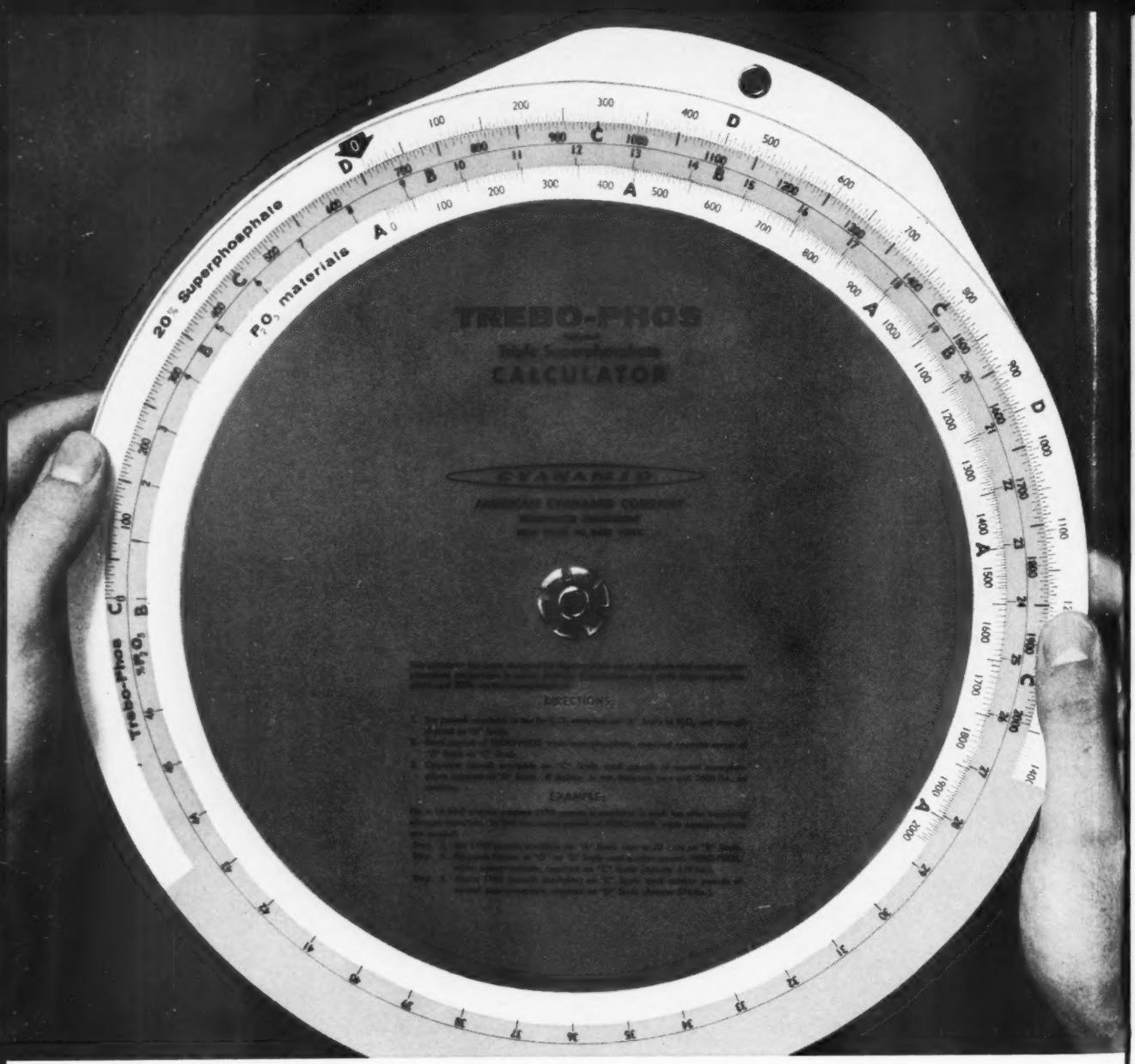


Superphosphate Calculator simplifies your mixing problems

...it's yours, courtesy of TREBO-PHOS*

TRIPLE SUPERPHOSPHATE

A precision instrument made of heavy-gauge plastic, this Trebo-Phos Calculator tells you in seconds the proportions of single (20%) and triple super you need to fill out any mixed goods formula. Saves your time, insures accuracy. *To get your free TREBO-PHOS CALCULATOR, simply write us.*

The Calculator works equally well on all brands of triple and single (20%) super. Naturally, we're looking forward to your calculating Trebo-Phos Triple Superphosphate for your mixes. We're proud of Trebo-Phos because our newly-built, ultra-modern plant produces Triple Superphosphate of superb uniformity and grade and high ammoniating quality. And, we're sure our prompt deliveries will please you.

*Trademark

CYANAMID

SAMPLE PROBLEM...
SOLVED IN SECONDS!

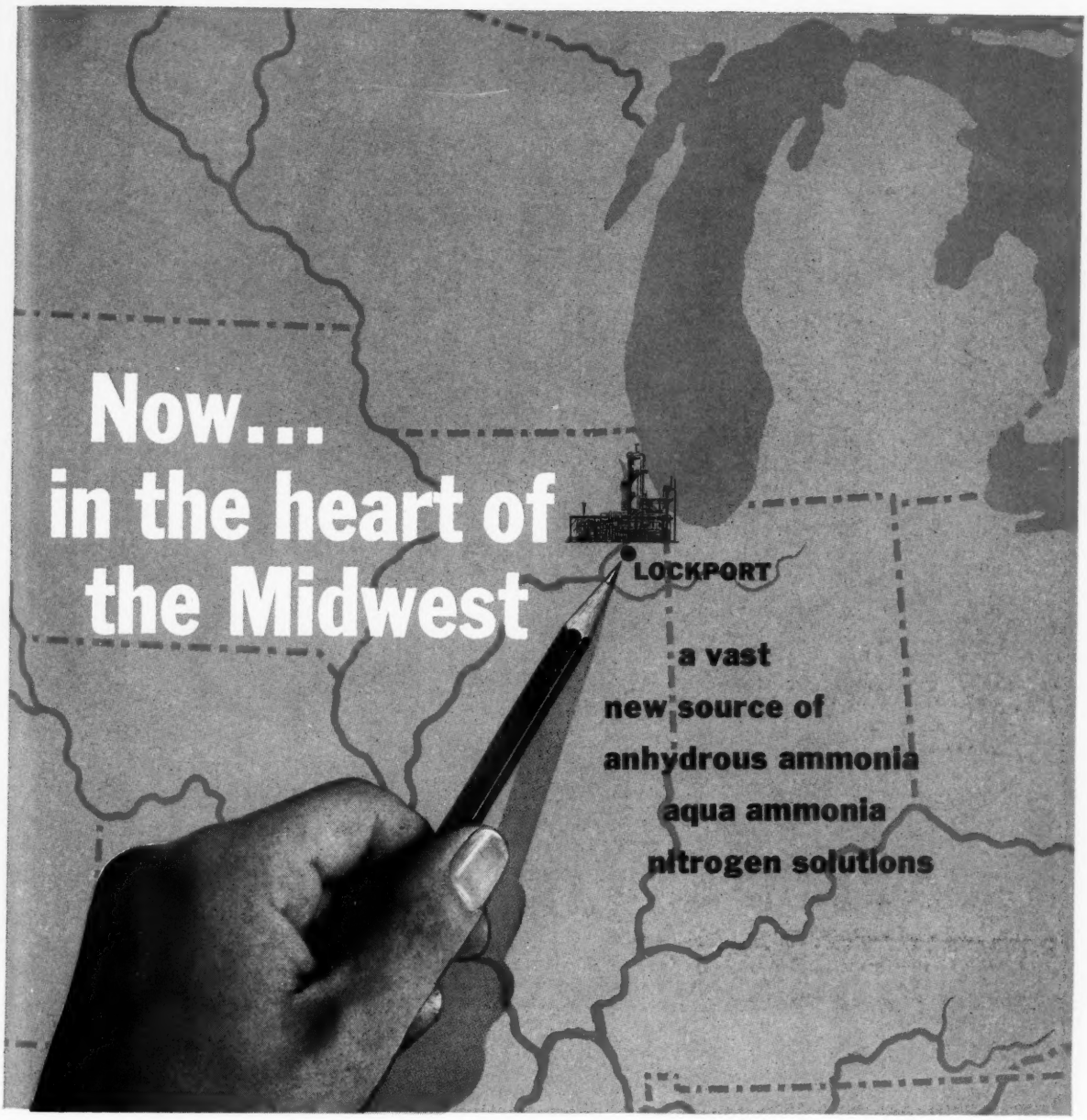
For a 16-20-0 mixture suppose 1195 pounds is available in each ton after supplying nitrogen materials. To find how many pounds of Triple are needed:

STEP 1. *Set 1195 pounds available on "A" Scale next to 20 units on "B" Scale.*

STEP 2. *Opposite Pointer at "O" on "D" Scale read number pounds triple superphosphate, required on "C" Scale*
(Answer 619 lbs.)

STEP 3. *Above 1195 (pounds available) on "C" Scale read number pounds of normal superphosphate required on "D" Scale*
(Answer 576 lbs.)

FOR YOUR FREE CALCULATOR WRITE:
AMERICAN CYANAMID COMPANY • PHOSPHATES DEPARTMENT • 30 ROCKEFELLER PLAZA • NEW YORK 20, N.Y. OR BREWSTER, FLA.



Texaco's new Lockport plant is centered among all major rail, water and truck routes—a reliable source of ammonia and nitrogen solutions.

TEXACO LOCKPORT (ILL.) AMMONIA PLANT NOW MAKING DELIVERIES

Orders for anhydrous and aqua ammonia, and nitrogen in a variety of solutions are mounting. The advantages of doing business with Texaco Lockport are compelling:

Texaco closeness: The new ammonia plant is located right in the heart of the farm belt. Shipping distances are shorter, formulators get faster and better service.

Texaco uniformity: The Lockport plant is new from top to bottom—new processing equipment to assure product uniformity; new handling equipment; and a brand-new transport fleet to speed deliveries and protect purity in transit.

Texaco service: Texaco is famous for its service. The Texaco man will see that your orders are handled according to instructions and that deliveries are scheduled to tie in with your operations.

For fast reliable petrochemical service, call or write The Texas Company, *Petrochemical Sales Division,* 332 South Michigan Avenue, Chicago 4, Illinois, or 135 East 42nd Street, New York 17, N. Y.

TEXACO

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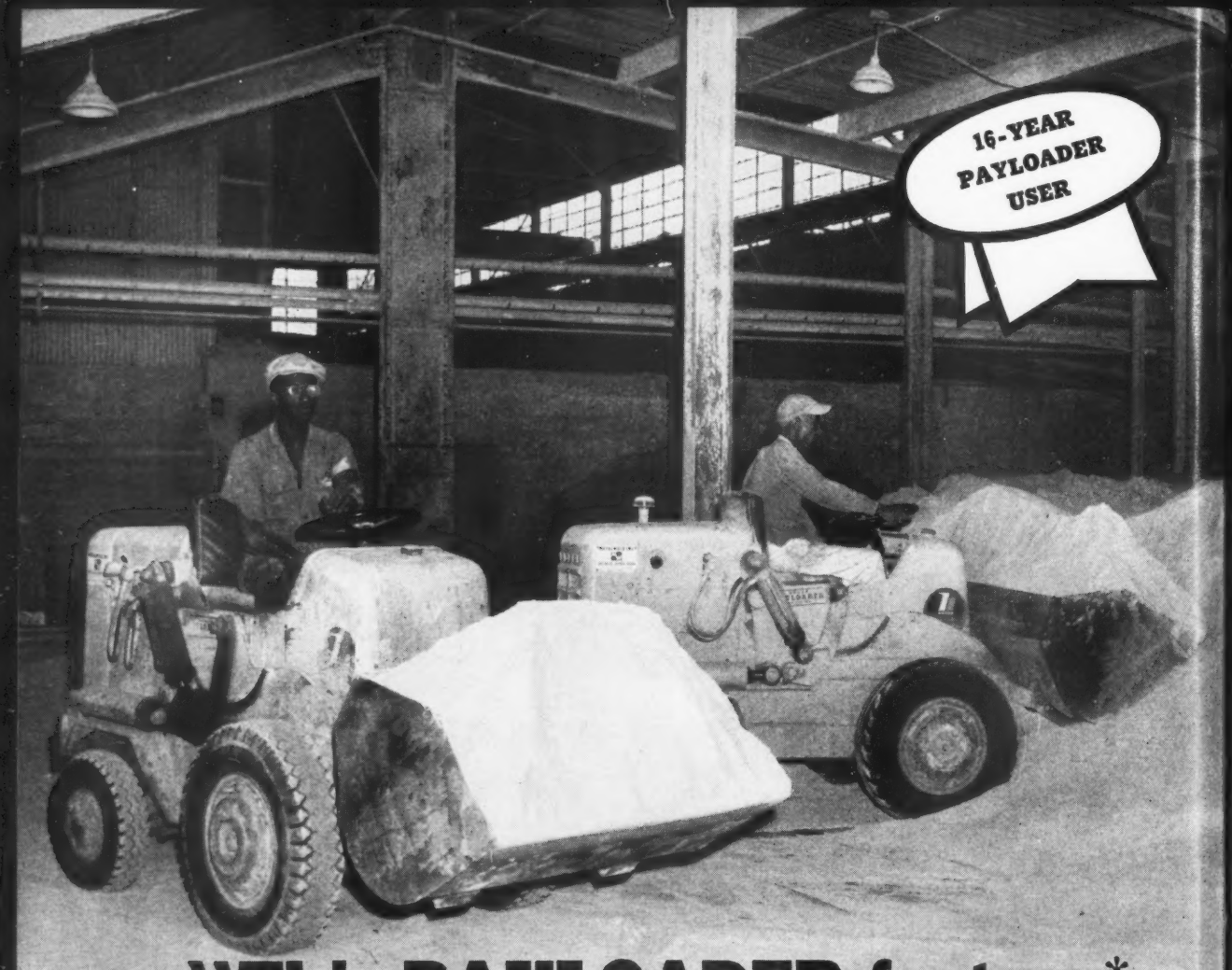
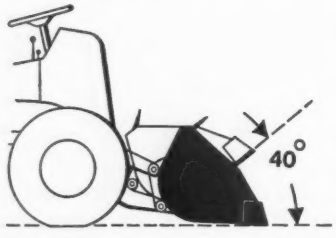
PETROCHEMICALS



"This PAYLOADER feature* nearly doubled our daily output..."

*40° ROLL-BACK AT GROUND LEVEL

Develops powerful digging force — brings bucket close to machine for maximum stability and carrying capacity, and least spillage loss while transporting loads.



F. W. Tunnell Company, producer of glue, grease and fertilizer, has been operating at the same Philadelphia location for nearly 80 years. It is also a pioneer user of tractor-shovels for bulk materials handling, having bought one of the original "PAYLOADER" tractor-shovels in 1941, and been continuous "PAYLOADER" users ever since.

Speaking of their two new-style model HA units, Tunnell's Vice President, E. N. Angus, says, "This 'PAYLOADER' feature [roll-back bucket] has nearly doubled our daily payload in most of the operation . . . gives us continuous delivery with very low downtime."

Smallest of the "PAYLOADER" line, the Model HA has a 2,000 lb. carrying capacity. Other operating features include hydraulic load-shock-absorbers, torque converter drive, rear-wheel steering, one-lever bucket control, two speeds in either direction. Your nearby Distributor will gladly demonstrate how a Model HA or larger "PAYLOADER" can improve *your* handling methods.

THE FRANK G. HOUGH CO.
704 Sunnyside Ave., Libertyville, Ill.

Send more "PAYLOADER" information on:

- ☐ Model HA (2,000 lb. carry capacity)
- ☐ Larger models (up to 9,000 lb. carry capacity)

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ STATE_____

SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

IN THIS ISSUE

▸ The author predicts a continuing increase in the use of the airplane for applying farm chemicals. He also goes into some of the things we will need in the line of application equipment in the future . . . **page 38.**

▸ Optimism seemed to be the keynote of the 5th annual Canadian Agricultural Chemicals Meeting. For a full comprehensive report of this important meeting . . . **page 41.**

▸ A du Pont executive takes a close look at the farm chemical business and outlines the role of the agricultural engineer and his contributions toward making it so successful . . . **page 42.**

▸ The fertilizer survey conducted for the National Plant Food Institute is now in its final stages. First returns are turning up some interesting results: some expected and some a surprise. What it is and how it started . . . **page 43.**

▸ Hercules Powder Co. had some facts about Toxaphene that didn't seem to agree with what other people were saying relative to boll weevil control. Here is what they did about it . . . **page 45.**

▸ The owners of the Huston, Culver Fertilizers over in Delaware got their feet wet in the liquid fertilizer business and liked it . . . This is a story of their success . . . **page 46.**

COVER PICTURE

The cover picture this month illustrates three of the most important machines used in the application of farm chemicals. It also calls to our attention the value of engineering in the continued progress of farm chemicals, for what good is the chemical if it can't be applied.

Farm Chemicals

Vol. 120 No. 11 November 1957

PIONEER JOURNAL OF THE INDUSTRY

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U. S. BORAX OPEN PIT MINE TO BE DEDICATED NOV. 14

To meet the steadily increasing demand for borate products, U. S. Borax & Chemical Corp. is completing a new open pit mine and refinery in the Mohave Desert area of Southern California which will boost total American output by 30 per cent.

Designed to be a fully mechanical operation from pit to finished product, the project represents an investment of $20,000,000 and more than two years' work. When officially placed in production Nov. 14 it will turn out about 70 per cent of the free world's total supply, the company said.

More than 2,000 employees and guests from all parts of the U. S. and abroad are expected to attend the opening and dedication ceremonies when the plant is formally inaugurated on Nov. 14.

FREEPORT REDUCES SULFUR PRICES $3

Freeport Sulphur Co. announced in September a reduction of $3 per ton in its domestic and export sulfur prices in order to meet competition.

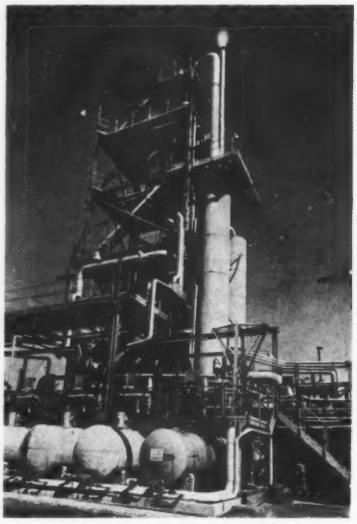
$4.8 MILLION NH_3 PLANT TO BE BUILT IN CALIF.

Construction of a 100-ton-a-day anhydrous ammonia plant was announced recently by California Ammonia Co. Lowell W. Berry, chairman of the board, and Bernell Harlan, president, said that the Macco Corp. of Los Angeles has been awarded the contract for engineering and erection. The plant will cost about $4.8 million, and Macco has promised completion in October, 1958.

California Ammonia Co. is a joint venture between farmer consumers and industry. Over 540 California farmers reportedly have subscribed in order to substantially reduce their fertilizer costs.

The board of directors has approved a management contract with The Best Fertilizers Co. for expediting and supervising the negotiations with the contractor and for a 10-year management contract for operation of the plant.

FRENCH BEGIN PRODUCING MALEIC ANHYDRIDE



The first commercial French plant for the manufacture of maleic anhydride was recently placed on stream by the Compagnie Francaise des Matieres Colorantes (Francolor). It is located at Villers-St. Paul, about 30 miles north of Paris.

Rated at about 2,200,000 lb/year of product, the plant was designed by Scientific Design Co., New York City, and uses a process developed by SD.

NOTT MFG. ACQUIRES ROSE MFG. COMPANY

Nott Manufacturing Co. has confirmed that they have acquired control of Rose Manufacturing Co., manufacturers of Tri-Ogen rose sprays and rose food.

Nott president Bob Harkins said that the acquisition was part of Nott's general expansion to offer its distributors a full and complete line of farm chemicals.

Herb Harkins, of Nott's organization, has been elected president of Rose.

ACP HOLDS INTERNATIONAL CONVENTION IN AMBLER, PA.

Seventy-seven delegates from 34 nations attended American Chemical Paint Co.'s International Convention in Ambler, Pa., September 23-28.

Each delegate who attended is a key research, development or expansion executive of progressive private enterprises in the world-wide chemical field and associates of ACP.

Agricultural delegates spent an important part of their convention time observing the latest testing and research methods at the Weed Control Section and Horticultural Crops Research Branch of USDA's Beltsville station. Many government, university, college and business authorities spoke at the sessions, including Dr. W. Ennis, USDA; Dr. O. Lee, Purdue; Dr. C. Fisher, Texas Ag Exp. Sta.; Ralph Kauffman, Asplundh Tree Expert Co.; Dr. B. H. Grigsby, Michigan State; Dr. M. B. Hoffman, Cornell; W. Dykstra, US Dept. of Interior Fish & Wildlife Service; Dr. S. Fertig, Cornell and Dr. W. Shaw, USDA.

CLIMAX SPONSORS AG RESEARCH GRANTS

A program totalling $25,000 in agricultural grants-in-aid at ten universities and two independent research foundations will be sponsored by Climax Molybdenum Co. during 1957–58.

Under this program, agricultural and biological research projects will be conducted on molybdenum as a trace element in an effort to compile additional data on its effect on plant life.

Climax has sponsored programs in agricultural research for the past eight years.

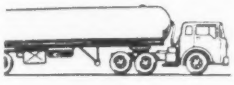
New from Sohio

the solution for granular fertilizers

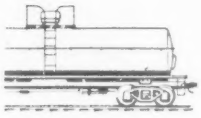
SOHIOGEN 16

(41.4% nitrogen)

saves up to $1.00 per ton in materials and manufacture



Sohiogen 16 . . . another pace-setting Sohio solution, developed by research, to match the fast changing scene in the fertilizer industry. And it's yours with a long list of benefits for granular manufacture . . .



- ★ **High fixed-to-free ratio — you can use more solution without over-ammoniation . . . require less acid neutralization.**
- ★ **Low salting out temperature — Sohiogen 16 is easier to handle and work with. Reduces storage problems. Low vapor pressure, too.**
- ★ **Produces hard granules — one size for ideal drillability, good storage. Minimum recycle ratio.**
- ★ **High nitrogen, low water content — reduces shipping costs, drying costs of finished goods.**
- ★ **Free-flowing, conditioned granules — result from perfectly adjusted Urea-Nitrate balance. Permits high solution usage with low moisture absorption of finished product.**

Sohiogen 16 has been tried and proved in full-scale, multi-plant manufacturing operations. Extensive tests show it can supply all of the nitrogen for granular fertilizers up to 12% — in some instances up to 15%.

For complete details call the "Man from Sohio" . . . see how new Sohiogen 16 can make money for you.

. . . we're serious about SERVICE at Sohio

SOHIO

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FARM CHEMICALS

— *Business & Management* —

DR. ROSE RECEIVES SPENCER AWARD

Dr. William Cumming Rose, Illinois biochemist, has been selected as the 1957 recipient of the Charles F. Spencer Award for meritorious contribution to agricultural and food chemistry.

The award is sponsored by Kenneth A. Spencer, president of Spencer Chemical Co., and is administered by the Kansas City Section of the American Chemical Society.

PERFECT SAFETY RECORDS AT 14 AACC PLANTS

Fourteen fertilizer plants of The American Agricultural Chemical Co. in September reported perfect safety records for six months or more.

The Spartanburg, S. C., plant has had no lost time injuries for more than four years. Plants at Henderson, N. C., and Pierce, Fla., have three-year records and those at Columbia, S. C., and Norfolk, Va., have two-year records, the company said.

4-H CLUB WORK AIDED BY FERT. INDUSTRY

Twenty-eight companies had contributed to the industry-wide campaign being carried on in behalf of 4-H Club work by October 1, according to John V. Collis, Federal Chemical Co., and R. E. Bennett, president of Farm Fertilizers.

Collis and Bennett kicked off a special fund raising program in behalf of the National 4-H Club Foundation on July 25. In a follow-up letter last month to the industry representatives they said, "The response from the fertilizer industry has been good, but we need more help."

They asked that companies wishing to contribute make their checks payable to the National 4-H Club Foundation and mail direct to Grant A. Shrum, executive secretary, 4-H Builders' Council, 8561 Fenton St., Silver Spring, Md.

ISC RECEIVES FELLOWSHIP IN AGRONOMY FROM TEXACO

Dr. C. L. W. Swanson of Texas Co. presents $2,500 check to Dr. W. H. Pierre of Iowa State. Dr. John Pesek, Jr., (center) looks on.

The Texas Co. has established a $2,500 Texaco Fellowship in Agronomy at the Dept. of Agronomy, Iowa State College. Its purpose is to encourage graduate study in the field of agronomy.

First recipient of the fellowship is John T. Moraghan, a graduate student in soil fertility, whose research work is being directed by Dr. John Pesek, Jr. and Dr. Lloyd Frederick.

NEW CSC DISTRICT OFFICE OPENED AT ATLANTA, GA.

A new corporate district office has been established by Commercial Solvents Corp. at 344 Williams St., N. W., Atlanta, Ga. T. Austin Young has been named district manager of the office, which will serve Alabama, Florida, Georgia, South Carolina and North Carolina.

DBL BECOMES DIAMOND ALKALI CO. UNIT

Operations of Diamond Black Leaf Co. have been integrated with the business of Diamond Alkali Co.

Loren P. Scoville, general manager of Diamond Alkali's Chlorinated Products Div., said that the former Diamond Black Leaf Co. organization now becomes Diamond Black Leaf Products, a unit of Diamond Alkali Co.

SPENCER UPS AMMONIUM NITRATE PRICES

A $2 per ton price increase in fertilizer grade ammonium nitrate effective October 1, 1957 and a $4 per ton increase effective January 1, 1958 have been announced by Spencer Chemical Co.

The new prices replace the price schedule of May 28, 1957. Price differential between October and January follows the standard industry pattern of seasonal discounts, the firm said.

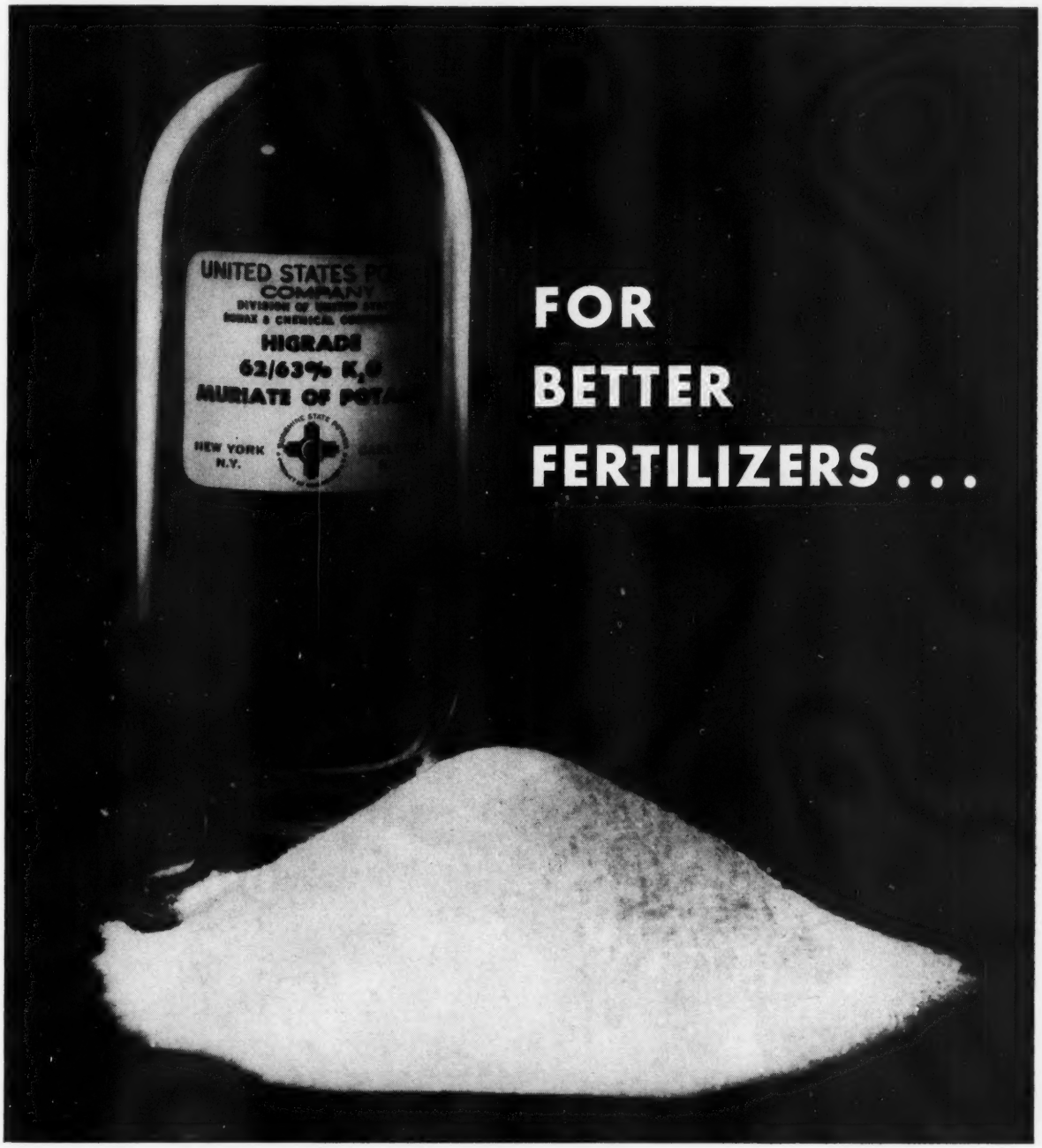
TEXAS GULF LOWERS SULFUR PRICES

Texas Gulf Sulphur Co. reported recently that it had notified all of its customers in the U. S. and Canada of a decrease of $3 per gross ton in the sales price of bright (top grade) sulfur and $2.50 per gross ton for dark sulfur, effective immediately.

General competitive conditions were given as the reason for the change.

VETERAN SMITH-DOUGLASS EMPLOYEES HONORED

Four Smith-Douglass Norfolk factory employees were honored at a recent ceremony in recognition of their length of service. Left to right are supt. Herman Powers, L. M. Hanbury, who received a 20-year pin, W. J. Rountrey, G. E. Ketchum and J. W. Cannon, 10-year pins, and production mgr. J. W. Zwemer, who made the presentations.



USP'S HIGRADE MURIATE OF POTASH

USP's Higrade muriate of potash (62/63% K_2O)—perfect for the manufacture of modern fertilizers. This superior white potash is non-caking and free-flowing throughout.

Our Technical Service Department stands ready to answer any inquiries.

USP also offers Higrade Granular muriate of potash—62/63% K_2O—and Granular muriate of potash—60% K_2O—both free-flowing and non-caking.

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DIVISION OF UNITED STATES BORAX & CHEMICAL CORPORATION
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A PRODUCT OF NEW MEXICO U.S.A.
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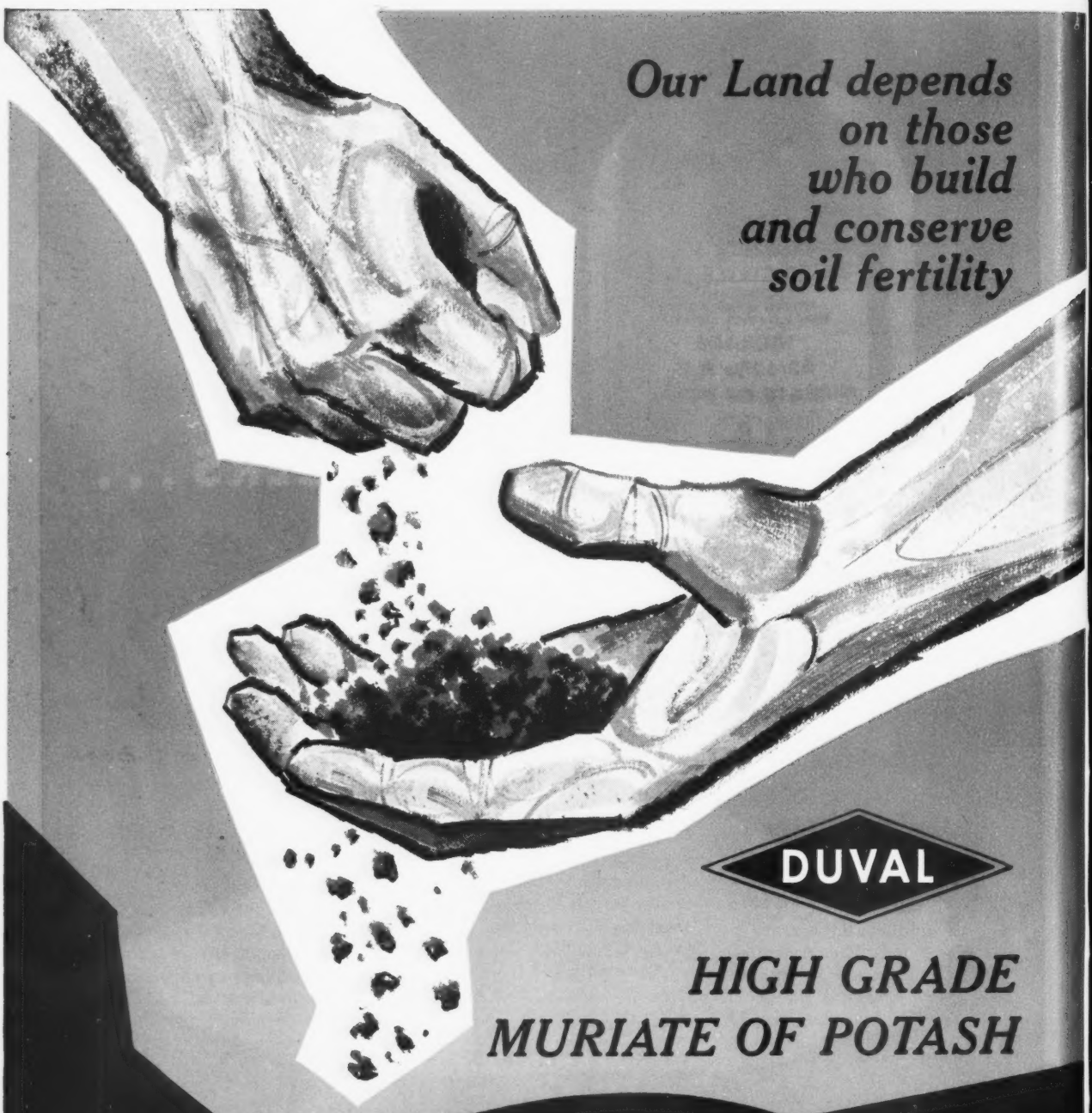

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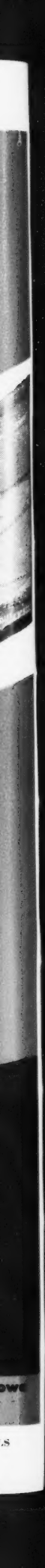

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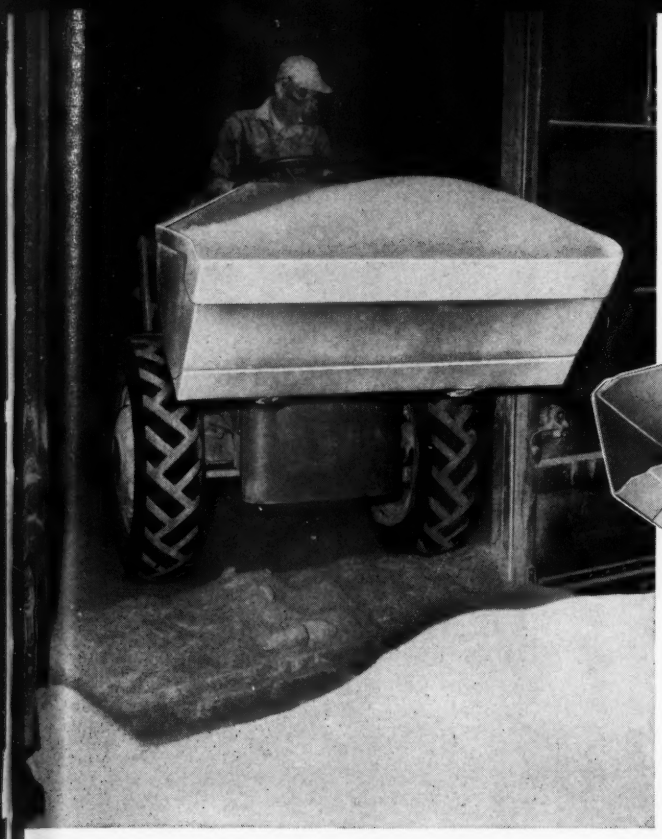
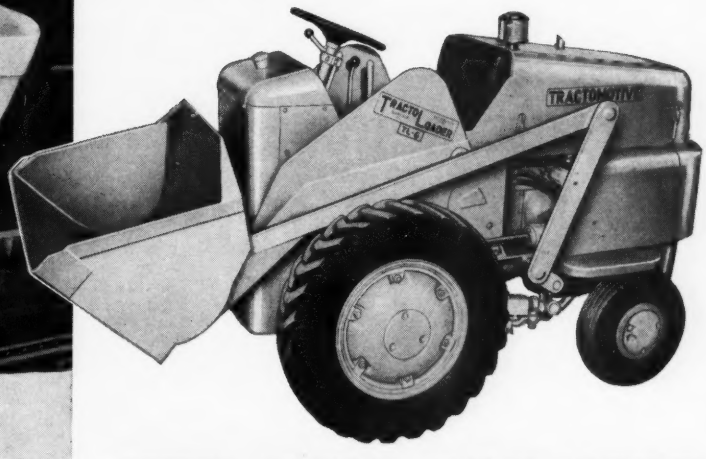


BUCKET CAPACITY: ½ cu yd
BRAKE HP: 33.7
SPEEDS: 2 forward; up to 10 mph
2 reverse; up to 20 mph
WEIGHT: 6,100 lb



TRY THIS FOR SIZE IN TIGHT QUARTERS

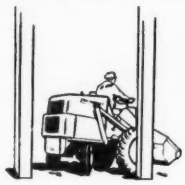
Compact TRACTOMOTIVE TL-6 TRACTO LOADER is a high producer in confined areas

Quickly unloads boxcars Users report it takes only two to three hours to completely unload a boxcar of bulk materials by using the TL-6 and a conveyor setup. Loading goes fast because there's a scooping action with tip-back bucket — and no ramming to get load. You ease bucket into pile and the hydraulic torque converter drive crowds in a heaping load — action is smooth, positive. No gear shifting either — operator just pulls or pushes a lever to go forward or reverse.

Travels through narrow aisles and doorways Compact design makes it easy to move material from one place to another in your plant . . . or to bring in material from outside stockpiles. Over-all length is only 9 ft, 7 in; width 4 ft, 5 in; height 5 ft, 4 in.

And loads are carried low, in a level position, with 50-degree tip-back of bucket — means less spillage, greater stability, better visibility and easier maneuvering.

Makes hairpin turns around columns and posts TL-6 keeps travel time down because it makes right-angle turns around columns and posts. No lost time maneuvering around, either — there is a short, 6½-ft turning radius. And the operator's job is made easier with Power Steering — now standard equipment!



Ask your Allis-Chalmers construction machinery dealer to show you how you can save time and money on close-quarter material handling with the TL-6 Tracto-Loader. See for yourself why

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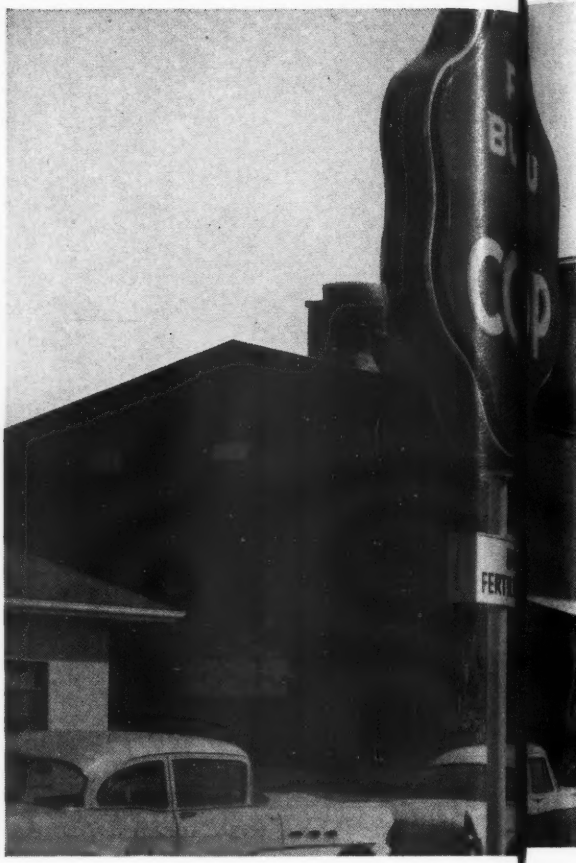
☐ Please arrange a demonstration of the TL-6
☐ Send catalog on Tracto-Loaders

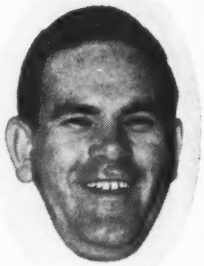
Name .....
Title .....
Company .....
Address .....
City ..... State .....

Our plant managers all agree...

"International's Triple hits a consistent high in product quality and service"



says A. R. Mullin,
General Manager,
Fertilizer Division
Indiana Farm Bureau
Cooperative Association



Activities at the Hartsdale plant are directed by William Henderson (right).

Ralph Middaugh (right) is superintendent of the Jeffersonville plant.

Robert R. Leach (left) supervises operations at the Briggs fertilizer plant.

The Indianapolis plant is managed by Plant Superintendent L. M. Leach.

Our requirements: Dependable service . . . desirable physical characteristics . . . uniformly high ammoniation and granulation results

"Basic goods get a rugged test in our fertilizer plants. And actual performance is the reason we place International's Triple Super right at the top when we figure our requirements," says A. R. Mullin, General Manager of Indiana Farm Bureau's Fertilizer Division.

Reports from the superintendents at the four modern plants (Briggs, Hartsdale, Indianapolis and Jeffersonville) show why.

International's Triple is a consistent, high quality product . . . very good for ammoniation and granulation. It has the desirable physical condition that plant people like to see in the Triple they're using.

"What's more International has proven that they can deliver the goods when we need it," Mullin adds.

And Mullin knows whereof he speaks. He has been with the Indiana organization since 1935 . . . took charge of the Fertilizer and Seed Division in 1944.

You, too, can rely on International's superior quality product and an aggressive, stimulating outlook in service, research and product development. Write or wire for full information.

INTERNATIONAL MINERALS *International* MINERALS CHEMICALS **& CHEMICAL CORPORATION**

PHOSPHATE CHEMICALS DIVISION . . . . . 20 N. WACKER DRIVE, CHICAGO 6, ILL.

FARM CHEMICALS People

American Agricultural Chemical Co. T. J. Mahoney has been named sales manager for Havana, Cuba, branch sales and sales promotion. Philip Stauderman becomes assistant manager of Pierce, Fla., sales.

American Cyanamid Co. Francis A. Raymaley has been appointed to the new position of grasslands specialist. While his services will be available throughout the U. S., his chief interests will be in the area north and east of Illinois and Kentucky, and eastern Canada.

Columbia-Southern Chemical Corp. Dr. Eugene J. Mezey and H. William Hockin join the Barberton, Ohio, research laboratory as senior research chemist and supervisor, minerals research, respectively.

Neubauer

Election of Joseph A. Neubauer as president of Columbia-Southern is announced. He succeeds Edwin T. Asplundh, who has been elected board chairman of Pittsburgh Plate Glass Co. and Columbia-Southern. A 46-year old chemical engineer, Neubauer joined C-S soon after his graduation from Case Institute of Technology in 1932.

Diamond Alkali Co. John A. Sargent has resigned as president and a director of DA. At a special meeting, the board of directors assigned presidential duties and responsibilities to Raymond F. Evans, chairman and chief executive officer.

In addition, the board created the position of executive vice president and elected A. H. Ingley, senior vice president, to the post.

Diamond Black Leaf Products. Appointment of Fredrik H. Raedel, Jr., as sales manager for consumer products has been announced by G. V. Dupont, general manager of the Diamond Alkali Co.'s Diamond Black Leaf Products unit.

E. I. duPont de Nemours & Co. Carroll E. Walls has been assigned as sales representative for DuPont nitrogen products in Alabama, Mississippi and Georgia, with headquarters in Atlanta.

Freeport Sulphur Co. Alfred J. Dickinson joins the firm as vice president and sales manager succeeding the late Roy B. Johns. He formerly was vice president of Virginia-Carolina Chemical Corp.

Dickinson

Grace Research & Development Div. Newly named vice president in charge of development is Francis J. Sergeys.

Hooker Electrochemical Co. has employed three patent assistants, Robert H. Bachman, James J. Ralabate and Donald A. Buchanan.

Hubbard-Hall Chemical Co. has appointed Professor Ralph W. Donaldson, recently retired as extension agronomist of the Univ. of Mass., to the position of consulting agronomist of its Agricultural Div.

Lebanon Chemical Corp. Kendall S. Tomlinson has been named sales manager for farm fertilizers. For three years he was northeast area sales manager for Nitrogen Division, Allied Chemical & Dye. Corp.

Tomlinson

Michigan Chemical Corp. has added Theodore L. Smith to its research staff at St. Louis, Mich. He is assigned to the organic research laboratories.

Munson Mill Machinery Co. William J. Purcell, general manager, died September 14 at the age of 52. In 1948 Mr. Purcell was appointed general manager and in 1951 became vice president.

National Plant Food Institute. Dr. W. H. Garman has been appointed regional director for NPFI in the Northeastern States. The first of four regional directors to be appointed under the Institute's program to expand its research and educational activities, he will continue to serve as its chief agronomic consultant in addition to his new assignment. His territory includes N. Y., Pa., N. J., Md., Del., New England and possibly W. Va.

Nitrogen Division, Allied Chemical & Dye Corp. Harold Kingery and Jack F. Dulaney

Kingery

Dulaney

have been appointed district sales managers, Kingery for the South-Central District with headquarters in Memphis, and Dulaney for Atlanta, with headquarters in that city.

TRIPLE SUPERPHOSPHATE

Phillips 66 Triple Superphosphate contains 46% available phosphoric acid. It has the physical properties essential for maximum ammoniation efficiency.

AMMONIUM NITRATE

New, free-flowing Phillips 66 Prilled Ammonium Nitrate contains 33.5% nitrogen. The small, coated prills resist caking, handle easily. Depend on Phillips 66 Prilled Ammonium Nitrate for top-notch crop response as a direct application material. It's an ideal companion high nitrogen fertilizer for your quality mixed goods.

5 PHILLIPS

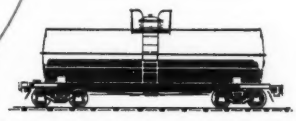
Materials for the Production of Premium Fertilizers

NITROGEN SOLUTIONS

Get more N per dollar! There are seven Phillips 66 Nitrogen solutions for use in preparation of high-analysis fertilizers and the ammoniation of phosphate materials. Use these solutions to help keep manufacturing costs low; help rapid, thorough curing.

AMMONIUM SULFATE

New premium quality Phillips 66 Ammonium Sulfate contains 21% nitrogen, 23.8% sulfur. It is dry-cured to remove excess moisture, prevent caking. Uniform dust-free crystals flow freely, mix easily. Ideal for all analyses of mixed goods and for direct application. Available in bags or bulk.



ANHYDROUS AMMONIA

Phillips 66 Agricultural Ammonia containing 82% nitrogen is a convenient, economical source of nitrogen for the formulation of mixed fertilizers. Immediate tank car shipments are assured through Phillips production facilities in the Texas Panhandle and at Adams Terminal near Houston. Phillips also has tank car pools at many key points.

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HOUSTON, TEX.—*6910 Fannin St.*
INDIANAPOLIS, IND.—*1112 N. Pennsylvania St.*
KANSAS CITY, MO.—*500 West 39th St.*
MINNEAPOLIS, MINN.—*212 Sixth St. South*
NEW YORK, N. Y.—*80 Broadway*
OMAHA, NEB.—*6th Floor, WOW Building*
PASADENA, CALIF.—*330 Security Bldg.*
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MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade coarse and uniform Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash Corporation

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FARM CHEMICALS People

Olin Mathieson Chemical Corp. Frank McQuade retired October 1 as assistant to the manager of sales for fertilizer products at the Curtis Bay plant. A dinner was given in his honor by A. B. Verdery, manager of the Plant Food Div. northeastern district, on Sept. 24.

Promotion of G. D. Baerman to manager of the Insecticides Products Dep.t has been announced. Baerman formerly was manager of field sales in the same department. C. M. Norton has been named assistant manager, Dr. Alfred Weed has been placed in charge of promotion of household insecticides and Paul Williams will be in charge of insecticide sales for the midwest territory.

Baerman

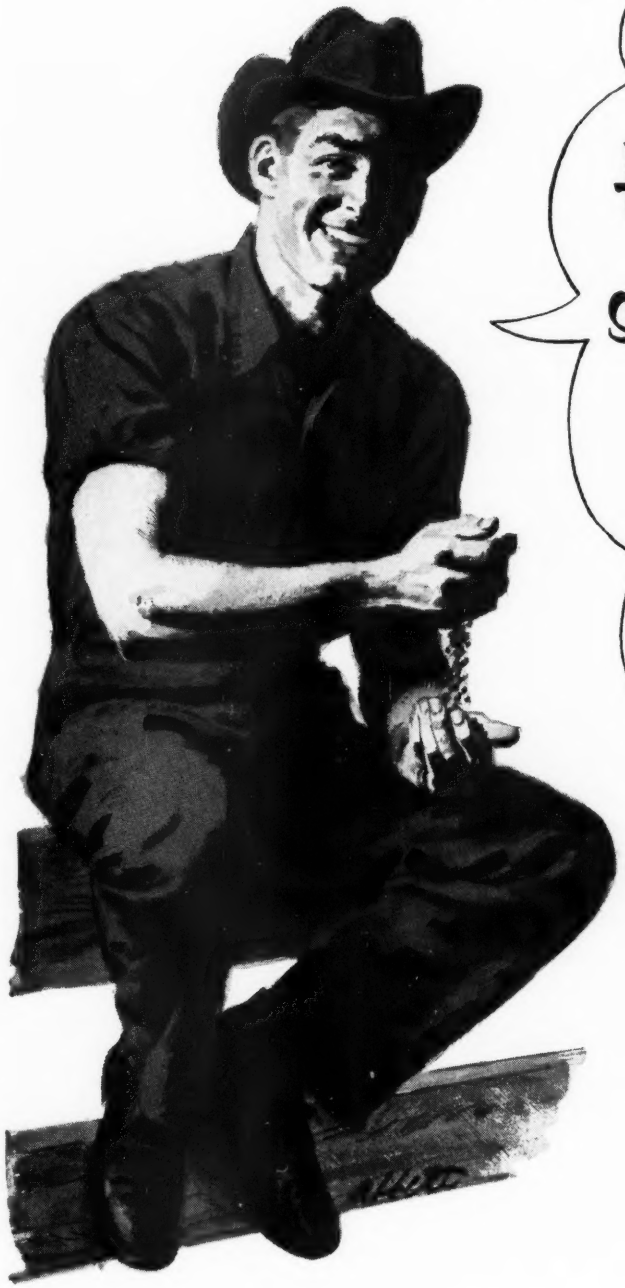
Panogen, Inc. New member of the research staff is Dr. Clare B. Kenaga, plant pathologist. From headquarters at the Panogen research laboratory at Woodstock, Ill., he will conduct research and field development work for both Panogen and its affiliate, Larvacide Products, Inc.

Potash Co. of America. Appointment of Joseph P. Scroggs as sales representative for the Georgia-Tennessee territory is announced. He also will work the Florida territory with Paul C. Ausley. J. Robert Mell, who had serviced these accounts, has been transferred to the Washington office. Scroggs will make his headquarters in the company's Southern Sales Office at Atlanta.

J. R. Simplot Co. sales personnel changes: A new position in the Sales Dept., that of director of market development, has been

(Continued on page 20)

BIG DAVE SAYS,



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GTS*

***DAVISON Granulated Triple Superphosphate**

EASY TO HANDLE—Because of its uniform particle size it spreads evenly and uniformly and is perfect for direct applications. Does not deteriorate in handling, packaging or storage.

IDEAL FOR FORMULATIONS—Because it is easy to blend. Excellent for alkaline goods and especially recommended for O-25-25.

HIGH IN P_2O_5 CONTENT—Because it is constant in analysis its guaranteed minimum is 45% A.P.A.

UNEXCELLED QUALITY—Because of Davison's more than century of experience in fertilizer formulation DAVISON Granulated Triple Superphosphate is the standard by which all other granulated products are compared. It is guaranteed to satisfy you on every count.

"TRIPLE" IN SERVICE AND DELIVERY TOO—You get DAVISON GTS *when* you want it, *where* you want it, the *way* you want it.

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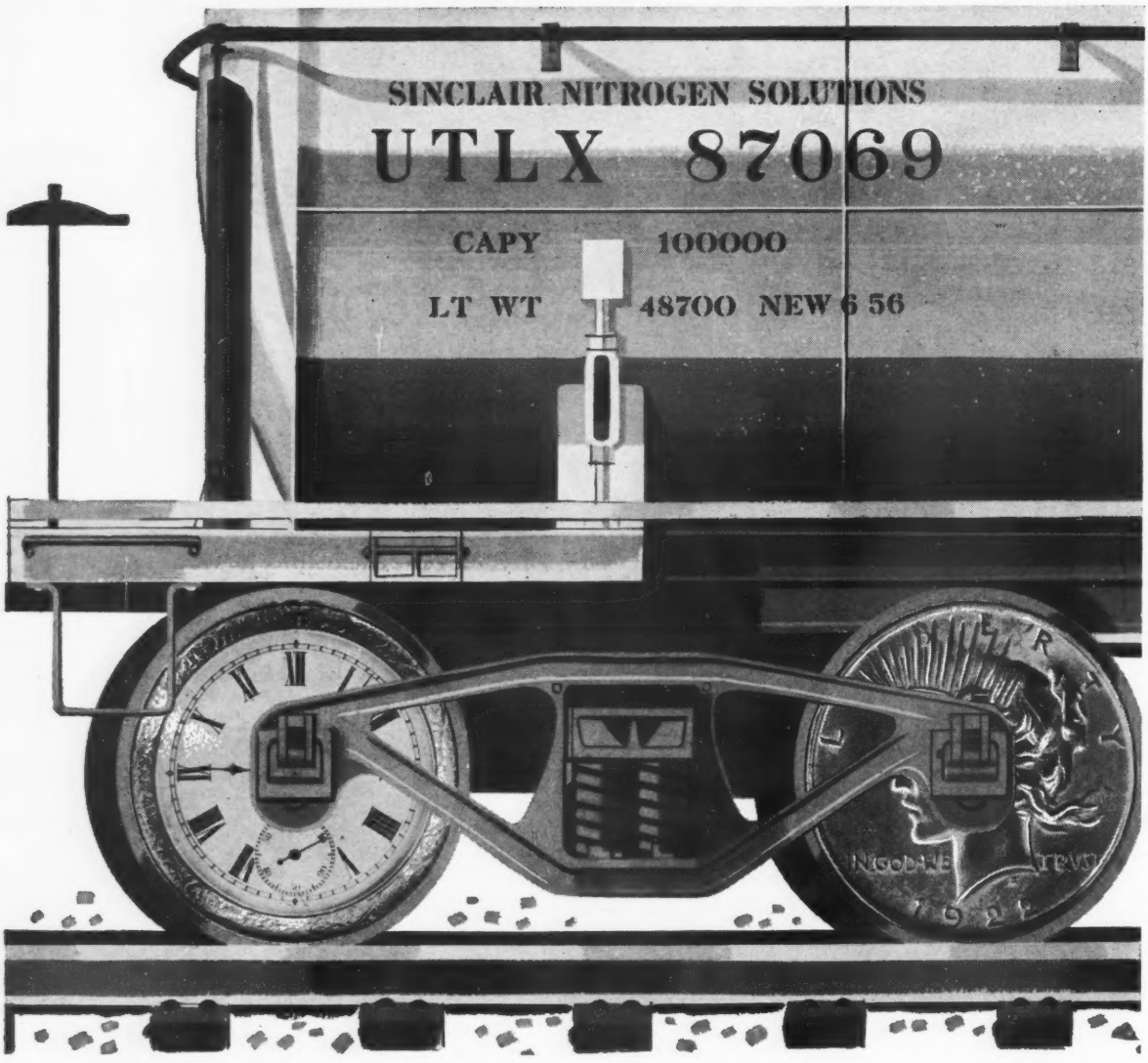

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CAN SAVE YOU TIME AND MONEY

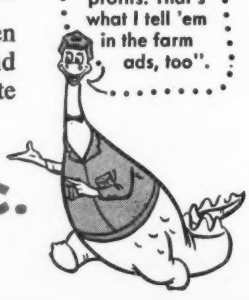
Rapid—on-time—delivery to your plant is an important reason why you should order nitrogen supplies from Sinclair. It can make the difference between filling an order at a profit or losing a sale and customer good will.

A big, new nitrogen plant at Hammond, Indiana, is in the center of the nation's rail and truck transportation network. Large storage facilities in this key location mean that your order can be filled for fast delivery when you need it.

For fast, low-cost delivery of nitrogen solutions, anhydrous ammonia and aqua ammonia call on Sinclair. Write or phone . . .

Dino, the Sinclair Dinosaur, says,

"Fertilize for greater farm profits. That's what I tell 'em in the farm ads, too".



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VIEWING WASHINGTON

with Farm Chemicals Washington Bureau

on agriculture

The farm surplus problem now shows signs of becoming more critical than at any time since the mid-thirties. Don't underestimate the potential. Agriculture officials, economists and farm leaders are showing increasing alarm over it. As one official put it: "Something is going to have to give--sooner than we thought."

The picture is this: For the past 5 years we've been struggling to reduce surpluses in cotton and wheat. During that time, only slight dents in surpluses have been made and prices farmers get for their production declined close to 20 per cent. Now, along comes a new surplus--in feed grains--which threatens to present even more grave problems throughout agriculture than the cotton and wheat surpluses.

The feed grain supply amounts to more than a year-and-a-half supply. It's the biggest we've ever had. Official forecasts are that grain prices during the year ahead may average 10 per cent below the past year's levels. The feed surplus points to still other surpluses, and lower prices to farmers. Livestock, for example, and hogs in particular. Hog production already is on the rise, with warnings of market collapse next fall.

Unless 1958 production is curbed voluntarily or by law, the feed grain surplus could be even more serious. There is nothing in sight now to indicate that output will be any lower, with all probabilities pointing to increased production--assuming continued favorable weather. For example, if Secretary Benson obtains authority to remove acre allotments from corn next year--private trade sources are forecasting a 4 billion bushel corn crop, compared with the record 3.6 billion in 1948 and 1956 and this year's 3.3 billion bushels.

The lower farm prices in prospect for the feed grains, and eventually for livestock, will have impact on almost every farm in the country. Practically every farm raises some livestock. This is not true of the cotton or wheat surpluses.

More fertilizer--and if insects threaten, more insecticides--will be demanded by farmers next year. Now being sensitized to lower per-unit prices ahead, word is that farmers will be enticed to produce even more on available acreage to make up in volume what they lose per bushel. Advertising and promotion aimed at moving fertilizer this fall may pull in more farm purchases because of this development.

Insect and pest control problems are being seriously slighted because the government is compelled to spend so much money on crop price supports, according to Secretary Benson. He indicated in a recent speech that USDA would be devoting greater energies to solving insect problems if it had the money. As it is, he declared, there's only enough money to

VIEWING WASHINGTON

agriculture continued

tackle the most urgent pest problems. If more funds are devoted to pest control, says he, some other type of farm spending must be reduced.

Cotton growers will vote December 10 on whether to accept marketing quota regulation on 1958 production. They've never failed to vote these strict rules on themselves, and last year approved them by a resounding 92 per cent of those voting. The quota has been established at 11,920,290 bales, based on the minimum acre allotment permitted of 17,391,304 acres.

Wheat production may top 1 billion bushels next year for the first time since 1955. Word received at USDA indicates farmers are "pouring on" fertilizer to help along favorable weather conditions. The winter wheat crop, which went in the ground this fall, is said to be off to the best start in years.

Cotton congressmen are out to get some guarantees for their growers in the next Congress. Chances for approval of direct compensatory payments by Congress, as some lawmakers want, are considered poor. And with the continuing surplus, there's little chance of much higher price supports. Lawmakers thus will attempt to put the current temporary acreage minimum of 17.3 million on a permanent basis.

The Soil Bank's acreage reserve made a poor showing in winter wheat areas this fall, as expected. A total of 3,800,000 acres were signed up, less than half of the 10,700,000 acres contributed last fall. Big reason for lack of farm interest is improved weather. Last year, the reserve was used primarily as crop insurance in winter wheat areas. As it is, the Soil Bank will pay about 140,000 farmers $77,000,000 if they stick to the rules. Prospects for land contributions from spring-sown crops, to get under way early next year, similarly are poor. This is the more certain because of forecasts that Congress will kill the program for failure to reduce production. Regardless of what's done on the program, however, the government will make good on acreage reserve contracts made this fall.

Fire-ant war of extermination now is under way in southern states. Federal and state agencies are pooling resources for an all-out assault. They figure it'll take at least 3 years to clean up this vicious pest which infests approximately 20 million acres, and threatens millions of others. Officials say extermination is the only solution to the pest, which stings so fiercely that fields can't be worked and which builds large mounds which damage farm equipment. Airplanes, motorized units and hand-to-hand combat techniques are being brought to bear. Major insecticides used are heptachlor and dieldrin at two pounds per acre. Home owners will be using chlordane in "do-it-yourself" projects.

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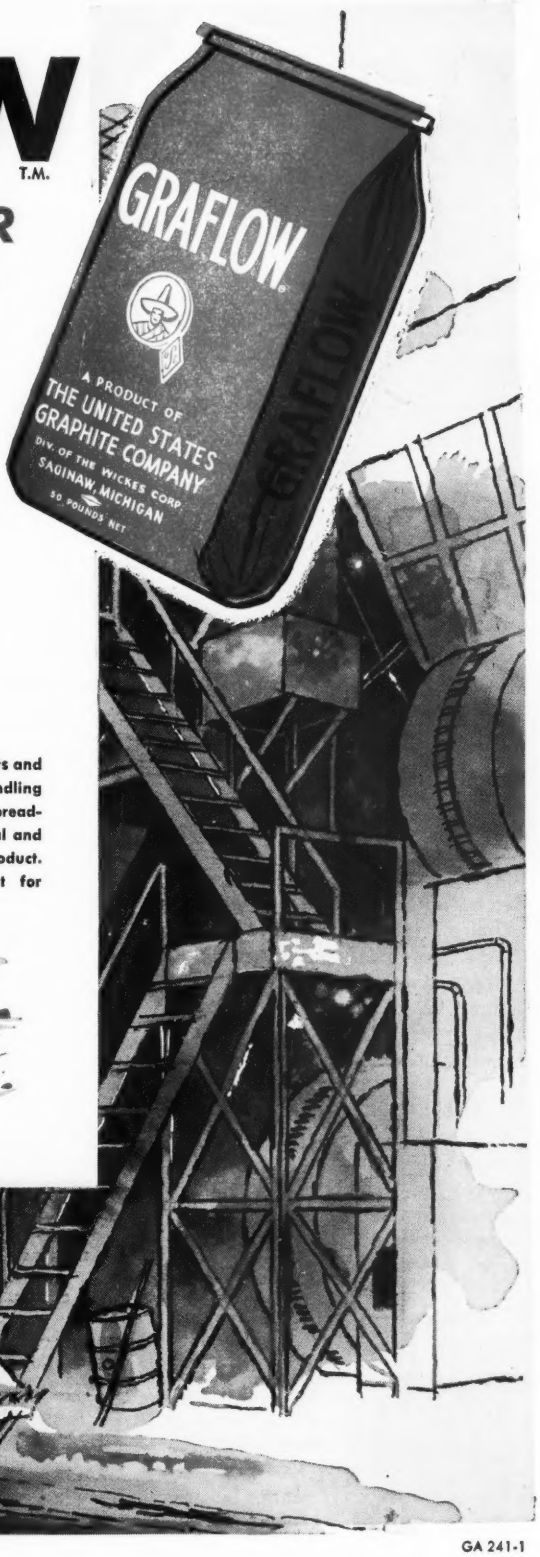
REDUCES WEAR IN YOUR MIXING EQUIPMENT

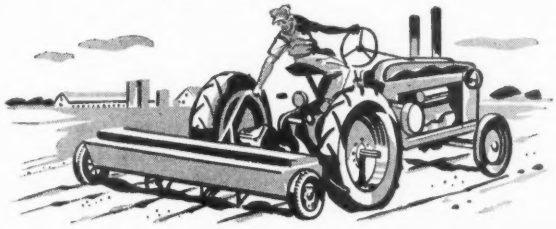
WHEN ADDED TO YOUR FERTILIZER

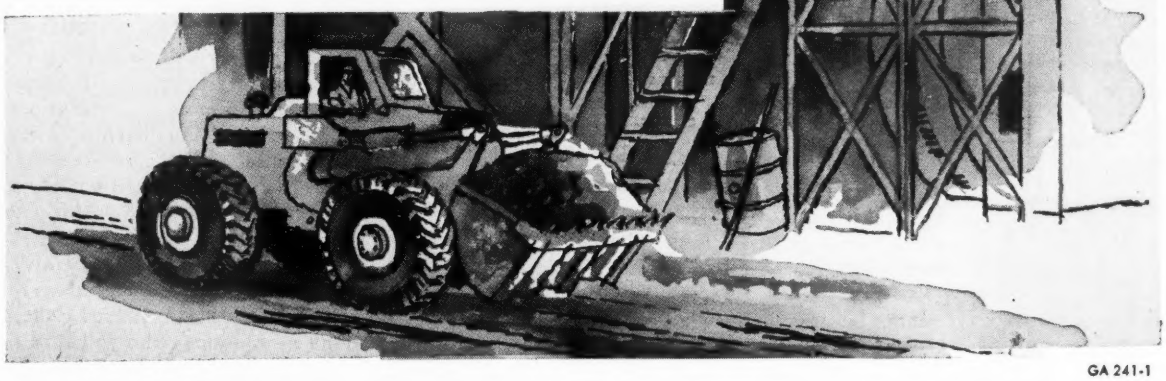
GRAFLOW is a conditioning agent for fertilizer that is paying for itself many times over in efficiently operated fertilizer plants. Added, as an ingredient, in either pulverized or granular form, GRAFLOW substantially reduces corrosion of the equipment in the mixing cycle. GRAFLOW reduces caking, and it increases flowability of your product.



THERE'S NEW SALES APPEAL IN A GRAFLOW TREATED PRODUCT

GRAFLOW is basically one of nature's finest lubricants and coating agents. Because it so greatly improves handling and reduces wear and corrosion in farm-fertilizer-spreading-equipment, GRAFLOW can provide an additional and effective sales and advertising advantage to your product. Write to our Chemical Development Department for complete information.





GA 241-1

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PEOPLE (from page 14)

filled by C. E. Brissenden; E. M. "Arkie" Cowen is new manager of the Platte Valley operation, in Scottsbluff, Nebr. which has a branch at Torrington, Wyo. Byron K. Wilson, named Midwest sales representative, will operate from Manhatten, Kans., and Larry Hyder, West Coast sales representative, will live in Placerville, Calif.

Smith-Douglass Co.'s board of directors has announced the election of R. S. Rydell as vice president for chemical products. Rydell has been president of the Coronet Phosphate Co. Div. since he joined the company in 1954. In his new position, he will direct the production and sale of Smith-Douglass Chemical products.

Rydell

Sunland Industries, Inc. elects officers: B. H. Jones, board chairman; Frank A. Easton, president and general manager; R. L. Brant, vice-pres. and asst. gen. mgr.; G. F. MacLeod, technical vice pres.; Erwin Luttermoser, secretary-treasurer.

The Texas Co. Willard Andy Clawson has been named petrochemical sales representative in Ohio and Michigan. Texaco is currently completing an anhydrous ammonia plant at its Lockport, Ill., refinery.

Velsicol Chemical Corp. Kimon T. Karabatsos goes to Velsicol as director of government relations. For the past two years, he was director of legislative and special services for the National Agricultural Chemicals Association. Karabatsos will headquarter in Washington, D. C.

Karabatsos

FARM CHEMICALS Associations & Meetings

NY COLISEUM TO HOUSE CHEMICAL EXPOSITION

The Chemical Exposition returns to New York after an absence of six years, occupying all four floors of the Coliseum for the first time. To be held Dec. 2-6, it is reported to be the largest ever held—more than 500 exhibits.

Admission will be by invitation and registration only.

NJCFA OFFICERS

New officers of the National Joint Committee on Fertilizer Application for 1957–58 were elected recently at the annual meeting in Palo Alto, Calif. They are Dr. W. H. Garman of the National Plant Food Institute, secretary; Dr. O. A. Lorenz, Univ. of Calif., chairman; and Dr. B. A. Krantz, Univ. of Calif., vice chairman in charge of program arrangements for the 1958 meeting.

AGRONOMISTS CELEBRATE GOLDEN JUBILEE

America's agronomists will celebrate their Golden Jubilee at the 50th annual meeting of the American Society of Agronomy, Nov. 18–22 at Atlanta, Ga.

Twenty-three charter members founded the Society on Dec. 31, 1907 at the Botany Dept. of the Univ. of Chicago. Today ASA has more than 3,300 members in the U. S. and 50 other countries. More than 40 per cent of the membership attends each annual meeting and a total of over 1,500 members and guests is expected for the Atlanta sessions.

W. M. Myers of the Univ. of Minn. is general program chairman, with M. G. Weiss, USDA, and G. B. Bodman, Univ. of Calif., as co-chairmen for the crops and soils programs, respectively.

SCPFES ELECTS OFFICERS

Officers elected by the South Carolina Plant Food Educational Society at its annual meeting in Clemson Sept. 25 are president, W. B. Nickles, Florence; vice president, J. Chiles Calhoun, Hartsville; and directors, Beaty Jackson, Anderson; Bryant Cooper, Mullins; Fred Atkinson, Hartsville; Wayne Dean, Columbia; Jim Gibbs, Charleston; G. L. Garvin, Columbia; and Frank Burgdorf, Columbia.

MORSE AND COLEMAN TO ADDRESS CFA CONVENTION

Under Secretary of Agriculture True D. Morse and Dr. Russell Coleman, executive vice president of the National Plant Food Institute, will be the featured speakers at the 34th annual convention of the California Fertilizer Association. Six hundred men and women from this country and Canada are expected to attend.

The meeting will be held Nov. 3, 4 and 5 at the St. Francis Hotel, San Francisco. Convention theme, "Our Partnership with Agriculture," will also be the subject of a panel discussion. Moderated by Dr. D. G. Aldrich, Jr., Univ. of Calif., the panel includes Dr. G. B. Alcorn, Univ. of Calif., representing official agriculture in the state; J. Earl Coke, Bank of America, who will speak for crop production financing agencies; John Martin, Jr., Salinas grower and shipper, on agricultural marketing problems; and Lowell W. Berry, The Best Fertilizers Co., representing the fertilizer industry.

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Manufacturers of fertilizer can depend on NATIONAL POTASH for a coarse and standard grade muriate of potash.

- DUSTLESS
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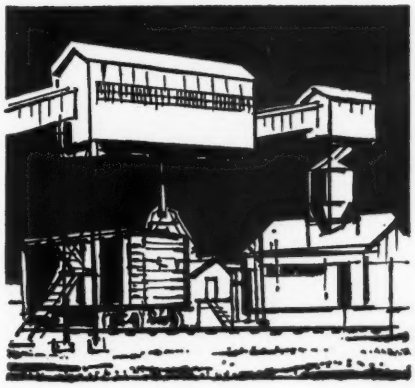
Ample stocks and extensive storage and shipping facilities assure you of prompt delivery of both bulk and bagged potash even during the peak fertilizer season. In addition NATIONAL POTASH offers a Free Technical Service to aid fertilizer manufacturers. *Telephone, wire or write us today.*



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FARM CHEMICALS

Associations & Meetings

EASTERN ENTOMOLOGISTS TO MEET THIS MONTH

A highlight of the program for the Eastern Branch Meeting of the Entomological Society of America will be a discussion of the "Elements of Entomology" by four leading entomologists. The meeting will be held at the Commodore Hotel in New York City on November 25 and 26.

"Garden Gadgets" will be the subject of an informal discussion to be held during the evening of Nov. 25. Other speakers will discuss problems involved in mass control of insects.

Dr. E. H. Smith, New York State Agr. Exp. Station, is chairman of the program committee and C. C. Alexander, Geigy Agricultural Chemicals, chairman of the Eastern Branch.

VORHES NAMED PRESIDENT OF AG CHEMISTS GROUP

At its 71st annual meeting in Washington, D. C., last month, the Association of Official Agricultural Chemists elected Frank A. Vorhes, chief of the Div. of Food of the Food and Drug Administration, its president for the coming year.

Also elected were J. B. Smith, state chemist of Rhode Island, as vice president, and William Horwitz, FDA, as secretary-treasurer. Kenneth L. Milstead, FDA, was named to the executive committee, along with M. P. Etheredge of Mississippi State College, retiring president, C. Charles Willits of Philadelphia, and A. H. Robertson of Albany, N. Y.

COTTON COUNCIL MOVES

The Washington office of the National Cotton Council has moved into new quarters in Room 502 of the Ring Building at 1200—18th St., N. W.

NEW OFFICERS OF PACIFIC N. W. PLANT FOOD GROUP

Frank Taylor, Ore.-Wash. Fert. Co., succeeds Ben McCollum, as president of the Pacific Northwest Plant Food Association.

Newly elected vice president is Ray Whitcomb, Link Distributing Co.; re-elected treasurer, Henning Waltersdorph, Magnolia Fert. Co.; and secretary, Leon S. Jackson.

Elwood I. Lentz, Western Phosphates, Inc.; Robert Marshall, Shell Chemical Corp.; and Trevor Steele, Amer can Potash & Chemical Corp. were elected to the board of directors.

NPFI OFFERS AID TO RR's IN REDUCING UNIT COSTS

IN THE interest of avoiding further rail freight rate increases, the National Plant Food Institute is offering "such assistance as it may appropriately give before regulatory commissions or otherwise, in helping the railroads to reduce unit operating costs."

This action is the result of a resolution passed by the Institute's Traffic Committee during its recent meeting in Carlsbad, N. M. The Committee also commended the Southern carriers "for their realistic forbearance" in the application of rate increases permitted by the Interstate Commerce Commission under Ex Parte 206 and urged railroad managements in other territories to follow the lead of the Southern carriers by applying the rate increases "on a realistic basis."

In passing the resolution, the group recognized the problems of increasing costs faced by the railroads, but deplored the effect of increasing freight rates in diverting fertilizer tonnage from the railroads to competing forms of transportation including private carriers.

The resolution offers to help the railroads achieve reduced unit operating costs by "(a) pursuing a more vigorous policy toward the abandonment of unprofitable passenger train services; (b) the substitution of trucking in lieu of rail services where operating economies may be achieved; and (c) the consolidation, where feasible, of duplicate services."

NPFI's Traffic Committee. Seated (l to r) J. L. Tompkins, Virginia-Carolina; R. O. Erickson, Anaconda Co.; Turner W. Blagg, U. S. Ind. Chemicals; John S. Carlson, Stauffer; Eugene Landis, International Min. & Chem.; Paul T. Truitt, NPFI Vice Pres.; Walter D. Matson, of NPFI General Counsel; Philip Janicola, U. S. Potash; John H. Wright, Ashcraft-Wilkinson. **Standing:** N. F. Cheney, American Pot. & Chem.; Lee Culbreth, Commercial Solvents; Bill Adams, Shell Chem.; D. L. Brooks, Escambia Chemical; Blair Love, Consol. Mining & Smelting of Canada; E. B. Luke, Western Phosphates; Ronnie Ellwing, IMC; Vernon Hansen, Sou. States Coop.; Howard McGalin, Olin-Mathieson; I. C. Dickerson, Phillips Petroleum; W. E. Maley, U. S. Borax & Chem.; Wilton Barger, Spencer; Lloyd Robinson, IMC; Zachary Taylor, Potash Co. of America; Jack McBride and Ralph Littrell, National Potash.

QUIZ
For Multiwall Bag Buyers

"How Does Your Packaging Operation Rate?"

1 Is your bag correctly sized for your product?
2 Is your bag properly constructed for your product?
3 If loss of product is caused by deterioration, would special protective sheets help to reduce such loss?
4 Is the total cost of your bag out of proportion to the selling price of your product?
5 Does your product cost warrant redesigning your bag to merchandise your product more effectively?
6 Are you using the most economical filling machine available for packaging?
7 Are your current suppliers giving you the service you desire?
8 Are your suppliers integrated and capable of maintaining dependable service at all times, under all conditions?
9 Are your suppliers' representatives qualified to help you with your packaging, sales promotion and marketing?

Perhaps we may be able to help you to arrive at the right answers in order to achieve higher production at lower costs.

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Gilman PAPER CO.
St. Marys Kraft Corp.
Gummed Tape Div.
The Cellucord Corp.
Kraft Bag Corp.

☐ O.K. Kraft...Help me to answer your Quiz. Please have representative call.

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JOHN DEERE VITREA . . . 45% NITROGEN FROM UREA

. . . the fastest growing, most versatile form of nitrogen on the market. Sell it with pride and confidence that it will win you many repeat sales and increased dollar profit.

VITREA is backed by an informative, hard-hitting advertising program.

JOHN DEERE UREA — AMMONIA SOLUTIONS

Improves physical properties of your mixed goods . . . non-corrosive to your equipment . . . safe to handle . . . resists leaching . . . suitable for either batch or continuous mixing . . . economical.

Write today for technical aid and information for your particular operations.

JOHN DEERE

Grand River Chemical Division of
DEERE & COMPANY
PRYOR, OKLAHOMA

CALENDAR

Nov. 3-5. 34th Annual Convention, California Fertilizer Association, St. Francis Hotel, San Francisco.

Nov. 6-8. Fertilizer Industry Round Table, Sheraton Park Hotel, Washington, D. C.

Nov. 12-13. 13th Annual Wyoming Weed and Pest Control Conference, Cody Auditorium, Cody, Wyo.

Nov. 13-15. National Aviation Trades Assn. Annual Convention, Hotel Adolphus, Dallas, Tex.

Nov. 17-19. Annual Convention, National Fertilizer Solutions Assn., Netherland-Hilton Hotel, Cincinnati, Ohio.

Nov. 18-20. Carolinas-Virginia Pesticide Formulators Assn. fall meeting, Carolina Hotel, Pinehurst, N. C.

Nov. 18-22. American Society of Agronomy, 50th Annual Meeting, Atlanta, Georgia.

Nov. 25-26. Eastern Branch Meeting, Entomological Society of America, Commodore Hotel, New York City.

Dec. 2-6. 26th Exposition of Chemical Industries, New York Coliseum, New York City.

Dec. 2-5. Fifth Annual Meeting, Entomological Society of America, Hotel Peabody, Memphis, Tenn.

Dec. 3-4. Iowa State College Fert. Mfrs. Conf. and Fert. Dealers Short Course, Memorial Union, Iowa State College, Ames, Iowa.

Dec. 9-12. Chemical Specialties Mfrs. Assn. meeting, Hollywood Beach Hotel, Hollywood, Fla.

Dec. 10-12. North Central Weed Control Conf., Hotel Savory, Des Moines, Iowa.

Dec. 11-13. Agricultural Ammonia Institute Annual Meeting, Hotel Marion, Little Rock, Arkansas.

Dec. 12-13. Beltwide Cotton Production Conf., Hotel Peabody, Memphis, Tenn.

Jan. 7-8. Texas Fertilizer Conference, Texas A&M, College Station

Jan. 8-10. Northeastern Weed Control Conference, Hotel New Yorker, New York City.

Jan. 13-15. Joint meeting, Weed Society of America and Southern Weed Conf., Hotel Peabody, Memphis, Tenn.

Jan. 20-21. "Pest-O-Rama", sponsored by Alabama Assn. for Control of Economic Pests, State Coliseum, Montgomery, Ala.

Jan. 21-23. Calif. Weed Conference, San Jose, Calif.

Arcadian® News

Volume 2 | For Manufacturers of Mixed Fertilizers | Number 11

A METHOD OF SOLVING GRANULATION PROBLEMS

PREDICTS EFFECT OF VARIOUS FACTORS ON LIQUID PHASE

Nitrogen Division Research Laboratories are developing information which can be used to predict the effect of changes in raw materials, water content, ammoniation rate, and formulation on the liquid phase of granular mixed fertilizers.

Information on how the liquid phase varies in a mixed fertilizer with changes in operating conditions and raw materials can be very useful, especially to the manufacturer faced with the problem of deciding which raw material or formulation to use for a given grade of fertilizer.

Formulation Changes Necessary

The fertilizer manufacturer of today must make many changes in formulation due to variations in costs and availability of raw materials, and because of the demand for many new higher-analysis grades. The frequency of these changes points directly to the need for some method to predict their effect on processing and product quality. Because most of the factors that affect the processing characteristics of a mixture and the end product quality are related to the liquid phase, an understanding of how this factor varies under different conditions is highly desirable.

The first step in determining the liquid phase of a granular mixed fertilizer is to predict the soluble salts in the fertilizer from the composition of the raw materials and the reactions that occur during processing. A measure of the liquid phase is then determined by holding a mixture of these soluble salts and water found in the final product at constant temperature, separating the liquid from the excess solids, and analyzing for water to determine the ratio of water to salt present in the liquid phase.

Research Program Organized

Using this method, Nitrogen Division recently organized a research program to study the effects of changes in liquid phase on the manufacturer of granular mixed fertilizers. The study covered a wide range of formulations, raw materials, and grades. This involved a great deal of laboratory work to determine the liquid phase relation for a number of complex salt systems found in mixed fertilizer. An electronic computer was used for the lengthy calculations involved in formulating and predicting product composition.

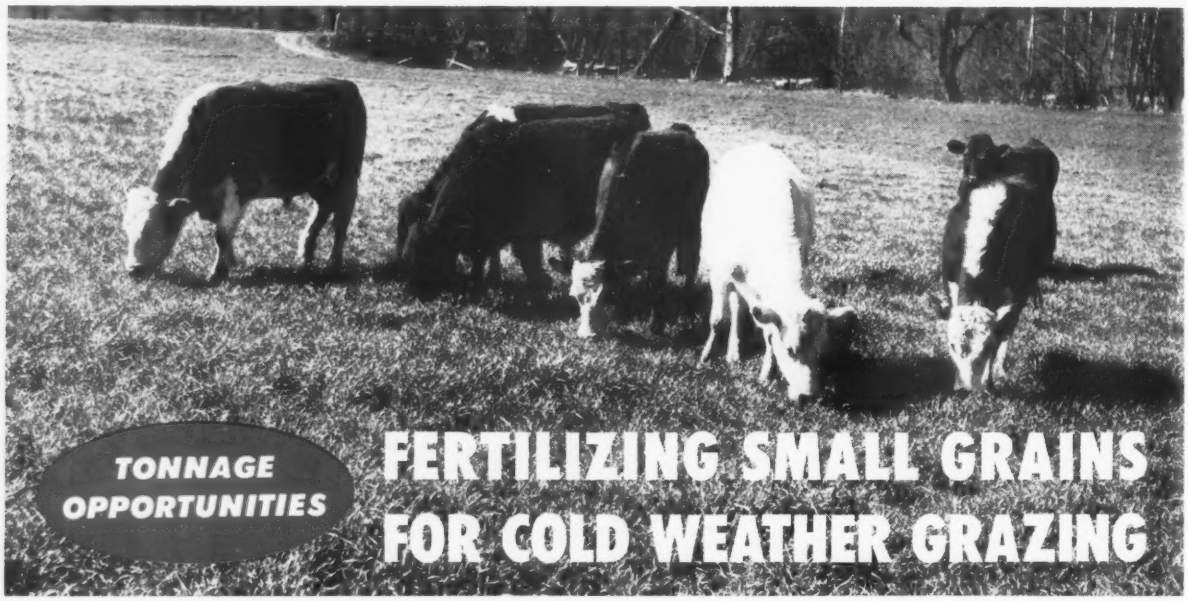
Application of Data

Data from this study is proving extremely valuable in explaining many observed differences in the storage and handling characteristics of various granular mixed fertilizers.

Nitrogen Division's work indicates that there is little place for generalizations in solving problems encountered in granulating mixed fertilizers. While two problems may appear to be the same, a close analysis may show that due to the difference in only one factor, the answers to the problems are entirely different.

Perhaps you are encountering mixing or conditioning problems in the manufacture of a concentrated or granular fertilizer. All of this recent data obtained by Nitrogen Division is now available to help you. Why not call on experienced Nitrogen Division technical experts for assistance? These men will help you in predicting the effect of changes in raw materials and processing conditions on your fertilizer manufacturing operations. It will pay off in a better, more profitable plant operation.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION



TONNAGE OPPORTUNITIES

FERTILIZING SMALL GRAINS FOR COLD WEATHER GRAZING

Grazing cattle on small grains during cold weather has been a common practice in the South for many years. Southern farmers discovered a long time ago that proper fertilization of small grains will produce fall, winter and early spring grazing plus a grain crop later.

Lately the practice has been spreading to colder climates. Experiment stations are testing it and farmers are trying it. Wherever it proves profitable, it expands fertilizer markets and helps to make the fertilizer business more of a year-round business.

Even in the Northeast, farmers are getting extra weeks of nutritious grazing from better-fertilized small grains. New, hardier varieties of winter oats are now being grown north of the Mason-Dixon line. New, vigorous strains of rye and Hessian-fly-resistant wheat make early and late seedings of grain a better bet to produce both grazing and a grain or cover crop.

In California, wheat experts are perfecting a perennial wheat which, with heavy fertilization, should produce two or more years of grain, followed by more years of good grazing—all from one seeding.

When experiment stations recommend grazing small grains they advise heavier fertilization. This means more mixed fertilizer at seeding and larger quantities of nitrogen or mixed fertilizer as top-dressing.

Extra fertilizer pays several ways. For fall grazing, it encourages earlier growth of lush, nutritious green feed. It keeps the grain growing later into the fall, as cold weather is offset by readily available plant food. Earlier stooling out and heavier growth with fertilizer assure good ground cover and strong roots to carry the grain crop through the winter after part of the foliage has been grazed off. Extra fertilizer also encourages earlier growth in late winter and spring.

Spring Fertilizer Needed

Tests as far north as New Jersey show that fertilized winter wheat produces a better yield of grain if the heavy fall growth is grazed down. Spring grazing, however, must be carefully controlled, and extra fertilizer applied, to assure a good grain harvest after grazing.

Fertilizer helps small grains produce feed with high nutrient value and beef cattle, dairy cows and other livestock love it. It helps provide low-cost feed for many weeks when no other grazing is available. By producing two crops from one sowing, it cuts labor costs and increases total yields per acre. On fertile soils, grazing also reduces lodging and makes grain harvest easier.

Cropping methods vary from South to North, but the extra fertilizer is needed everywhere. Small grains seeded in sod, and following cash crops, are typical through the South and in many specialized crop areas. Further North, some farmers sow spring oats in early fall to provide good grazing until hard frost. They may sow rye, winter oats or wheat late, to get early spring grazing along with a grain crop. Or they may combine an oats seeding for fall feed with a winter grain for spring grazing plus a grain harvest.

Increased grazing of winter grains is building fertilizer markets. As livestock production expands, and farmers search for efficient new ways to grow feed, new sales opportunities develop for fertilizers.

Valuable New Book For Fertilizer Men

"SOIL" the 1957 Yearbook of Agriculture, recently published by the United States Department of Agriculture, is packed with timely and useful information helpful to everyone concerned with the manufacture and sale of fertilizers.

Fertilizer agronomists and salesmen will find this book a valuable aid in assisting their farm customers to obtain greater benefits from the proper care and fertilization of soils. It is non-technical and easy to read and understand.

The book concentrates on efficient soil management and presents new and comprehensive information on this subject. Of particular interest to fertilizer men are the sections on nutrient needs, fertilizer manufacture and use, major and secondary plant foods, trace elements, fertilizer application, fertilizer economics, etc.

This 784-page volume is a veritable treasure house of facts that every fertilizer man should know. Available at only $2.25 per copy from Superintendent of Documents, Government Printing Office, Washington 25, D.C. It's so popular the supply will probably be exhausted fast.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

How To Sell Yourself On ADVERTISING

To convince yourself that your company needs to advertise, it will pay you to use many of the same arguments that convince a farmer that he needs to fertilize. The function of advertising is very similar to the function of fertilizer.

Fertilizer grows crops, advertising grows sales. Both are great multipliers; they multiply success. Neither fertilizer nor advertising is a cure-all. Everything else essential to the end result must be functioning properly to get the greatest benefit from fertilizer or advertising.

To produce the best returns with fertilizer, the farmer must start with good seed. He must cultivate his field properly. He must protect his crop from insects. He must have reasonably good weather conditions. He must have some one there to harvest his crop when it's ready for picking.

To produce the best returns from advertising, the business man must start with a good product. He must cultivate his market properly. He must protect himself from competition. He must have reasonably good economic conditions and he must have salesmen out asking for orders.

To produce bigger sales, advertising must be used in the proper balance and in the right amounts at the right times, just as fertilizer must be used in the right balance in the right amounts at the right times to produce bigger crops.

It's just as difficult to sell advertising to a business man who has never used advertising and doesn't believe in advertising as it is to sell fertilizer to a farmer who has never used fertilizer and doesn't believe in fertilizer.

The easiest man to sell fertilizer is a man who has used a lot of it over a period of years and has discovered what it will do for him. The same is true of advertising.

There is just as much prejudice against advertising among business men as there is prejudice against fertilizer among farmers. Most of the criticisms that have been leveled against advertising by business men have also been used against fertilizers by farmers: "***It's too expensive. I can't afford it. It's a necessary evil. I can remember when I produced all the profits I needed without it. Lots of folks get along all right without it. Think how much more I would make if I could save that money.***"

Some farmers are convinced that fertilizers are no good because they have used 100 pounds per acre without seeing any results. Some business men are convinced that advertising is no good because they have used small amounts in a big market without seeing results.

There has been far more money wasted by using too little fertilizer than by using too much fertilizer. The same is true of advertising. You have to use a very heavy application of fertilizer per acre before you reach the point of diminishing returns. The same is true of advertising.

When a farmer uses plenty of fertilizer and gets a big crop, fertilizer seldom gets credit for it. He's just a good farmer with plenty of money. When a business man uses plenty of advertising and gets big sales, advertising seldom gets credit for it. He's just a good business man who knows how to hire good salesmen.

You can condition a market by plowing in advertising just as you can condition a soil by plowing in fertilizer. You can build a better farm with fertilizer. You can build a better business with advertising.

The crop-producing power of the soil will soon disappear if you stop using fertilizer. Consumer demand for your product will soon disappear if you stop advertising. You have to keep replenishing your market with advertising, just as you have to keep replenishing your soil with fertilizer.

When the farmer uses enough of the right fertilizer at the right times, he gets a far greater return from all of his other investments and efforts. The business man can get exactly the same results from properly-directed advertising used in sufficient quantities.

THE BEST FERTILIZERS ARE MIXED FERTILIZERS
NITROGEN DIVISION, ALLIED CHEMICAL · SUPPLIERS OF NITROGEN TO THE FERTILIZER INDUSTRY

MIXED FERTILIZER POSTER

Large posters similar to this in full color are now appearing on hundreds of billboards in leading farming areas. Small, full-color reproductions are available as long as the supply lasts, first come first served. Request these (11 inches long or 30 inches long) from Nitrogen Division, Allied Chemical, 40 Rector St., New York 6, N. Y. Can be used as window streamers or posters. Supply is limited; order early.

HERE'S THE BIG LINE OF Arcadian® NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION Allied Chemical & Dye Corporation

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Columbia 1, S. C., 1203 Gervais St. ..... Columbia 3-6676
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Memphis 9, Tenn., 1929-B South 3rd St. Whitehall 8-2692
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Kalamazoo, Mich., P. O. Box 869 ..... Kalamazoo 5-8676
St. Paul 4, Minn., 45 N. Snelling Ave. ..... Midway 5-2864
San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

FREE INFORMATION to help you solve fertilizer, pesticide problems

Reader Service

Chemicals

304—SOHIO FOLDER

There's a new four-page, two-color brochure available from Sohio Chemical Corp. which gives specifications, descriptions, uses and shipping information on the company's anhydrous ammonia, aqua ammonia, nitric acid, urea and 83 per cent ammonium nitrate solution. If you'd like a copy,

CIRCLE 304 ON SERVICE CARD

305—VELSICOL GIBBERELLINS

Velsicol Gibberellins can expand your business into a "growing" market with a very high sales potential, the manufacturer states. Free formulation data and bulletin summarizing previous test information on this amazing new plant growth stimulant are now available from Velsicol Chem. Corp. Just

CIRCLE 305 ON SERVICE CARD

306—ISOBUTYRONITRILE DATA REPORT

A technical data report describing isobutyronitrile has just been published by Eastman Chemical Products, Inc. It includes specifications, properties and a number of basic reactions such as hydrolysis, reduction, oxidation and the formation of amidines, hexahydrotriazine and ketones. A free copy can be obtained by

CIRCLING 306 ON SERVICE CARD

307—CONTROLLING SOIL PESTS

How major soil pests can be controlled by soil fumigation is described in a series of three new leaflets just published by Stauffer Chemical Co. Practical procedures are outlined for the use of Vapam to kill annual and perennial weeds and germinating weed seeds, soil fungi which cause seed decay and damping off, nematodes and such insect pests as the garden centipede. Copies are available without charge. To get yours,

CIRCLE 307 ON SERVICE CARD

How to use the

READER SERVICE CARD

- **Circle number of literature you want.**
- **Print or type your name, position, company and address.**
- **Clip and mail the Service Card.**

308—THE STORY OF DIAMOND CHEMICALS

Diamond Alkali Co. has just published the fifth edition of "The Story of Diamond Chemicals—Chemicals You Live By."

The 32-page booklet, profusely illustrated, presents a panoramic picture of Diamond chemicals, their principal applications, and their production in a style and format which are both interesting and informative to technical and non-technical readers.

For your copy,

CIRCLE 308 ON SERVICE CARD

309—URAMON BOOKLET

A new booklet on urea ammoniating solutions, including detailed unloading and handling instructions, has been issued by the Du Pont Polychemicals Dept., manufacturer of Uramon ammonia liquors for the fertilizer industry. A chart in the booklet emphasizes the advantages of urea nitrogen as a fertilizer for all crops. Other tables offer complete information on the characteristics of Du Pont's urea ammoniating solutions. Copies of the booklet may be obtained free by

CIRCLING 309 ON SERVICE CARD

Process Equipt.

310—LIQUID FERTILIZER EQUIPT. CATALOG

A new condensed catalog has been published by General Metals Inc. on its line of equipment for nitrogen solutions and complete liquid fertilizers. The catalog pictures and gives a brief description of most all of the items in the General Metals line—from storage tanks to field applicators. A free copy is yours by

CIRCLING 310 ON SERVICE CARD

311—DORR-OLIVER BOOKLET

If you plan to expand your present fertilizer plant facilities, Dorr-Oliver says it will pay you to check with them. The company recently designed a phosphoric acid plant for Norske Zinkkompani A/S of Odda, Norway, and reports that the automatic plant attained full operating capacity of 60TPD of P_2O_5 in just two weeks. For a copy of a D-O booklet,

CIRCLE 311 ON SERVICE CARD

Packaging

312—ALUMINUM FOIL BAGS

Multi-wall aluminum foil bags now are offered as a replacement for steel drums in the bulk shipping of many industrial and chemical products, according to a brochure just published by Reynolds Metals Company.

The brochure, titled "Multi-Wall Foil Bags," points out that 60 empty multi-wall foil bags, with filled capacity of 30,000 pounds, can be stored in the space now occupied by one drum with only 400 pounds capacity.

Reynolds Metals Company, it was pointed out, does not manufacture multi-wall bags, but supplies aluminum foil to manufacturers of the new bag.

For your free copy just

CIRCLE 312 ON SERVICE CARD

313—BEMIS "DUETTE"

Bemis "Duette" valve multiwalls won't clog, have positive closing action and can't sift, reports Bemis Bro. Bag Co. The Company says that the Duette is actually two valves in one with a double check action. For the complete story,

CIRCLE 313 ON SERVICE CARD

Materials Handling

314—FORK TRUCK ATTACHMENT

A Pul-Pac attachment for palletless materials handling has been introduced by Clark Equipment Company's Industrial Truck Division for use on the company's new Clarklift Model 30,40 and 50 solid-tire fork trucks. The attachment also fits the gas and electric powered Carloader models, and the Y40 pneumatic tire truck.

Complete specifications can be obtained by just

CIRCLING 314 ON SERVICE CARD

315—FRONT END LOADER

Euclid Div. of General Motors Corp. has just introduced a new front end loader with a rated payload capacity of 19 cu. ft. Struck capacity of the bucket is 14 cu. ft.—maximum lifting load is 3,000 lbs. It is the first, and smallest in capacity, of several loader models that will be built by Euclid for bulk material handling and other work suitable for front end loader equipment. The manufacturer claims that the L-7 has a number of features that provide exceptional maneuverability, easy operation and good versatility for intra-plant material handling. For details,

CIRCLE 315 ON SERVICE CARD

316—CASE STUDIES OFFERED

A "packaged" presentation containing seven case studies of how various manufacturers solved production, storage and shipping problems with modern materials handling equipment is available free from Lewis-Shepard Products, Inc. All of the case histories but one are four pages long, and each is fully illustrated with photos taken right in the plants. Equipment used to solve the handling problems are hand lift trucks, electric fork lifts and electric "walkie" trucks. For free copies of the seven case histories,

CIRCLE 316 ON SERVICE CARD

317—PORTABLE BEAM SCALE

A new Centennial Model portable beam scale for general use in agriculture and industry has been introduced by Howe Scale Co. Known as the Model "57" in commemoration of Howe's 100th anniversary, the all-metal scale has a capacity of 1,000 pounds. Four types of beam are available—single, single with drop lever, double and full capacity "Du-Al" beam. For complete details and specifications,

CIRCLE 317 ON SERVICE CARD

Miscellaneous

318—SCREEN REFERENCE CATALOG

L-S screens reduce downtime and replacement expense, insure better product quality and uniformity, according to Ludlow-Saylor Wire Cloth Co. The company, which designs and builds its own looms to produce wire cloth, has a condensed screen reference catalog available. Just

CIRCLE 318 ON SERVICE CARD

319—VALVE LUBRICATION, MAINTENANCE CHART

A new, 19 x 24", three color chart containing maintenance and lubrication information for Rockwell-Nordstrom lubricated plug valves has been issued by Rockwell Mfg. Co. Suitable for display on shop, engineering and maintenance office walls, it features detailed exploded views of four types of valves—two-bolt cover, screwed gland, three-bolt and Hypreseal. Also included is a table of recommended lubricants for oil, water, gas and chemical service, as well as complete instructions on valve servicing. For your chart,

CIRCLE 319 ON SERVICE CARD

320—BROCHURE ON HOSE & HOSE ASSEMBLIES

Facts and figures concerning chemically resistant, high and medium temperature hose and hose assemblies for industry have just been released by Resistoflex Corp. A new 12-page brochure of technical as well as general information and specifications is available from the firm. Copies are available by

CIRCLING 320 ON SERVICE CARD

How to use the

READER SERVICE CARD

- **Circle number of literature you want**
- **Print or type your name, position, company and address,**
- **Clip and mail the Service Card.**

321—ALUMINUM FOR TANKS & VESSELS

"Reynolds Aluminum for Tanks and Vessels" is the title of a new 16-page booklet prepared by Reynolds Metals Co. Listing more than 100 general types of chemicals for which aluminum applications are particularly advantageous, the booklet serves as a basic technical guide to design, fabrication and applications of aluminum tanks and vessels. For a free copy

CIRCLE 321 ON SERVICE CARD

322—TRANSMISSION BELT CATALOG

A new catalog has been issued by Extremultus, Inc., manufacturer of the new type of power transmission belting made of polymer and chrome tanned leather. The catalog contains sections on significant applications, a description of the belt, selection of the proper belt type, tensioning and maintenance, and bearing load reduction.

Free copies are available. Just

CIRCLE 322 ON SERVICE CARD

323—PVC PIPE CATALOG

Where corrosion resistance or weight are factors in determining the type of piping system to install, A. M. Byers Co. says you will find its 30-page catalog on PVC pipe informative. It contains specific data on PVC's general characteristics, properties, applications and installation techniques. An 8-page chart classifies the corrosion resistance ratings of Types I and II PVC, low carbon steel, three classes of stainless, cast iron, aluminum, copper, red brass, lead, monel and inconel with 383 chemicals. For your copy,

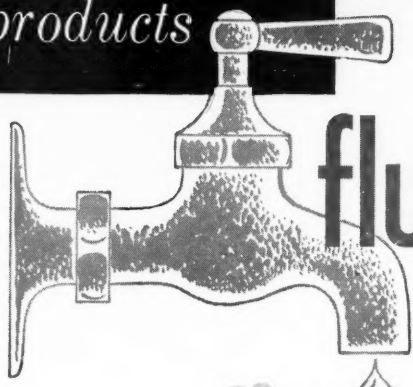
CIRCLE 323 ON SERVICE CARD

See pages 50 and 52 for information on these Reader Service Numbers:

324—Vulcan Drums
325—LPG System
326—2 Minute Test
327—New Calculator
328—Maracarb X-1

SULPHUR

helps to create headline products



fluoridated WATER

Some communities will, some won't . . . adopt fluoridation of drinking water for the purpose of reducing tooth decay. The subject is hotly debated but one thing is certain: wherever fluoridation is adopted a derivative of Sulphur will enter the picture.

Several chemicals can be used for fluoridation but they all stem from hydrogen fluoride. To produce this gas, a fluoride-bearing mineral is reacted with sulphuric acid.

As today's Headline Products are studied, it's significant that so many require for their production one or more derivatives of Sulphur.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units • Newgulf, Texas • Moss Bluff, Texas • Spindletop, Texas • Worland, Wyoming

THE MAN WITH THE MULTIWALL PLAN

UNION
PACKAGING SPECIALIST
J. R. GARMON

takes 40,000 lbs. off a packer's shoulders

Lifting twenty tons of filled bags a day is a lot of labor. It's inefficient, too, as a large chemicals producer learned during a recent survey of his Multiwall operation made by Union Packaging Specialist J. R. Garmon.

Garmon suggested a new system of *sliding* the customer's bags from the check-weigh scale to the bag flattener. This would not only relieve packer fatigue of manually lifting a 40,000 lb. bag load each day, but also assure full-capacity, full-time operation of the bagging equipment.

Union Multiwall Recommendations are based on this 5-star Packaging Efficiency Plan

- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

Another recommended economy tip: redesign style, proportion, and construction of existing multiwall bags. This will result in annual savings of $1400 to $8000 for each 450 M of the various size bags used.

Such savings are not unusual when Union's 5-Star Packaging Efficiency Plan goes to work for a company. Write for complete information about this Plan. It costs nothing. There is no obligation.

Better Multiwall performance through better planning

union camp

UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

UNION MULTIWALL BAGS
UNION BAG-CAMP PAPER CORPORATION
233 BROADWAY, NEW YORK 7, N. Y.

10,000 hours . . . only $700 repair costs

Work record of first Michigan Tractor Shovel important since today's Michigans have same basic power train design

When the first Michigan Model 75A Tractor Shovel rolled out of Clark's Benton Harbor (Michigan) plant in 1954, company engineers *knew* it was good. But who could expect it to put in 10,000 working hours on a tough job . . . and still be "good enough to last many, many more years," (according to the satisfied owners, Indiana Farm Bureau's Indianapolis fertilizer plant). Five months a year, their "old" 1¼-yard Michigan Tractor Shovel operates on *a three-shift basis*—moving an average of 60,000 pounds of superphosphate and other materials *per hour* from storage piles to mixing units. It also handles mixed fertilizer, cleans spillage, and pushes freight cars.

Still has original tires, axles

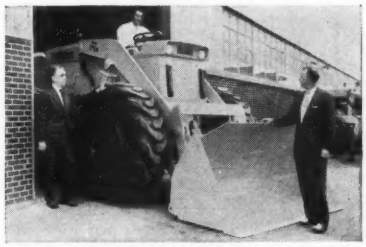
In service equivalent to 5 years' normal 8-hour-a-day use, replacement parts have cost only $700, according to Lewis Risinger, Master Mechanic. "And," he says, "we've *never broken an axle, or replaced a tire,* which is unusual in our operation. I need only three socket wrenches to take the whole power-train apart—it's a fast, simple job that sure cuts downtime."

Operator praises power shift transmission

"I've noticed," says Plant Supt., Melvin Leach, "that whenever there's a choice, operators always pick the Michigan. Even a new man learns to operate it in a hurry." Operator Bob Jefferson especially likes the "power shift and steer, the bucket action, and the fact you don't have to 'grind' gears and wheels to keep close to the pile."

Liked the first—bought four more

Since he authorized purchase of this first Michigan Tractor Shovel, Ben Scharrer, head of the Bureau's Fertilizer Division, has bought four more Michigans for Bureau plants in Indianapolis and Jefferson, Indiana. "One of the things I've been pleased to see," says Mr. Scharrer, "is that there have been no changes in the basic Michigan design. Except for natural wear, the first Michigan is as up-to-date as machines coming off the line today!"



6000th MICHIGAN NOW ON THE JOB

Michigan Tractor Shovel No. 6,000 —produced a little over two years after the first one—is now at work for Ohio Gravel Co., Cincinnati. It has the same all-Clark "flywheel to drive-wheel" power train as do the first and all other Michigan Tractor Shovels.

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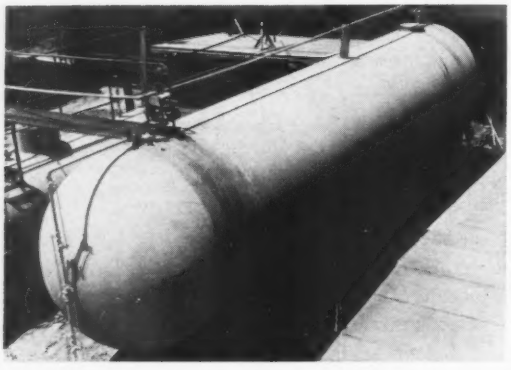
Government

USDA PREDICTS INCREASE IN USE OF CHEMICALS FOR AGRICULTURE

Treatment of crops and farm land with agricultural chemicals, especially by air, will probably increase rapidly in the next few years, continuing the trend that began at the end of World War II, USDA says. Chemicals used will include fertilizers, insecticides, weed killers and fungicides.

The most spectacular progress is likely to be made in what may be termed agricultural aviation, USDA forecast. Special planes, engineered specifically for releasing either liquid or dry chemicals, are already appearing and are expected eventually to replace the war-surplus aircraft that have carried much of the load thus far in agricultural aviation.

Ground equipment, too, will be improved. Recently a spreader for releasing granulated insecticides was designed by USDA engineers working in cooperation with the staff of the Texas Agricultural Experiment Station. The new spreader is a modified version of a conventional dust spreader. Its vanes have been rearranged to give uniform distribution of granular material. The spreader gives a uniform swath from an altitude of 25 to 70 feet at 100mph and is designed to release up to 30 pounds of insecticide per hour.



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TVA MADE 1% OF FERTS. CONSUMED DURING 55-56

The phosphate and nitrogen fertilizers TVA produced during the 1957 fiscal year represented a little over one per cent of the fertilizer consumed in the Nation during the 1955–56 crop year, TVA said last month. Total TVA production was 266,000 tons.

TVA said the year was an active one in process development. Several of the new developments centered around new uses for the continuous ammoniator-granulator, several were new fertilizers and others were new methods of producing or improving conventional fertilizers.

The new materials or processes attracting most industry attention were said to be superphosphoric acid, new high-strength liquid fertilizers, superphosphates for immediate ammoniation, ammonium phosphate-nitrates, granular superphosphates by a low-cost continuous one-step process and nitric phosphates by a new method which lowers equipment costs and increases the flexibility of such processes.

Twenty-five licenses to use TVA's patented chemical engineering developments were issued during the year to chemical and equipment manufacturers, making a total of 118 royalty-free licenses issued to date.

MARTIN SORKIN NAMED NEW ASS'T TO SECRETARY

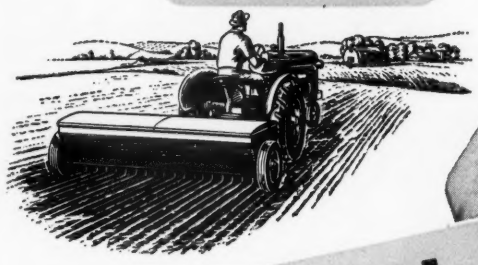
Martin Sorkin of Hyattsville, Md., succeeds Don Paarlberg as assistant to the Secretary of Agriculture. Paarlberg recently became assistant secretary for marketing and foreign agriculture.

WINTER WHEAT ACREAGE RESERVE

For the period ended Sept. 20, a total of 73,281 Acreage Reserve agreements had been signed by farmers placing 1,964,705 acres of winter wheat allotment land in the 1957 Acreage Reserve.

For the comparable period a year ago, 106,485 agreements had been signed placing 6,392,561 acres in the 1957 winter wheat Acreage Reserve.

TENNESSEE CORPORATION



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Bellwood, Illinois

VULCAN CONTAINERS INC., Bellwood, Illinois

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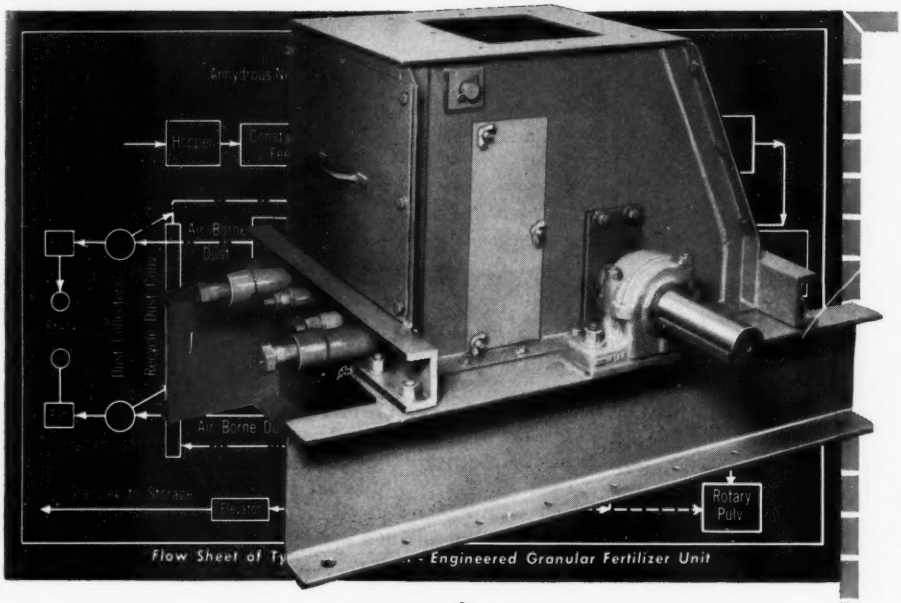

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FUTURE APPLICATION EQUIPMENT FOR FARM CHEMICALS

Kenneth Messenger
Plant Pest Control Division
Agricultural Research Service
United States Department of Agriculture

SINCE "discretion is the better part of valor," I will not indulge in a series of outright predictions, but rather review recent developments and current trends, looking ahead only as far as the facts justify.

The tremendous growth in both air and ground equipment has been brought about by various factors:

(1) Chemicals have been developed that can be applied as liquids in concentrated form, thereby enabling applicator aircraft to operate in competition with ground equipment and in areas inaccessible to such equipment.
(2) Inexpensive used aircraft and trained pilots were abundant after World War II.
(3) Plant scientists have developed crops more attractive to pests as well as to people.
(4) Public acceptance of infested or inferior products has diminished rapidly.
(5) Scores of introduced pests—for instance, pink bollworms, Mediterranean fruit flies, and gypsy moths—have demanded special attention.
(6) Crop losses formerly charged to soil deficiency or disease have been found to be due to nematodes or other pests.
(7) Selective herbicides, insecticides, and fungicides have found wide acceptance.
(8) Improved inorganic fertilizers and the demonstration of their value have rapidly increased their use.

These are but a few of the many factors that have influenced the growth of application equipment. They are cited for two reasons: First, to emphasize the rapidly expanding requirements of such equipment and, second, to lay a foundation for the consideration of future requirements.

Now let's consider these factors and how they influence the use of aircraft. Currently, the acreage treated by aircraft in the United States is equivalent to approximately one-fifth of its cultivated land. The dependence we place in such vehicles seems rather remarkable when we consider that almost all of them were designed for purposes having no relation to agriculture. At considerable cost in efficiency and safety, we are, during this pioneering period, utilizing aircraft such as passenger and cargo carriers, trainers, bombers, and even fighters.

The relatively low cost of war-surplus aircraft and converted, mass-produced types has been a deterrent to the design and manufacture of specially designed agricultural models. However, several are making their appearance, and undoubtedly within the next few years they will begin to effect a substantial replacement of less suitable types and justify their higher cost through increased safety and efficiency.

I do not mean to decry the work of all aircraft now in use, for many of them operate capably. But their days are numbered, and the surplus market will soon exhaust itself as far as agricultural needs are concerned, since most currently produced military types and many commercial types are too fast for agricultural work.

These new types will generally be capable of slower flight during operations. They will take off and land in shorter distances. They will apply either dry materials or liquids. They will offer the pilot better visibility and greatly reduce his susceptibility to injury in case of accident. They will carry a larger payload for a given horsepower rating.

With this improvement in aircraft, dispersal equipment must keep pace. There are now perhaps half as many different chemical-dispersal devices in aircraft as there are applicator firms. Since the number of planes used by one operator averages less than three, the diversity in equipment is indeed great. However, public and private research has advanced some principles that have found rather wide acceptance, and the trend toward a standardization of mechanical details is accelerating.

The problem, of course, has increased in complexity with the remarkable results of research that have given us such an array of new agricultural chemicals, approximately 90 per cent of which had never been used before 1945. This complexity applies to ground as well as aircraft equipment, but the cost of aerial tests is vastly greater, and each aircraft type has a different configuration with its own peculiar effect on chemical-distribution patterns.

As an illustration, we may look at one effort to improve uniformity of distribution of granulated insecticides, a type of material of great value for some purposes and perhaps with potential in the production of cotton. Preliminary tests were made with a spreader not unlike some dust spreaders now in use. The deposit varied from 5 to 60 pounds per acre across the swath. In cooperative work between the

Plant Pest Control Division, U. S. Department of Agriculture, and the Texas A & M College, this spreader was modified to give uniform distribution. The significant aspect of this illustration is that for this single purpose more than 130 test flights were made, with eight different spreader modifications, before the desired results were obtained.

Not only may different types of materials require the use of equipment of different design, but each type of aircraft makes individual demands on the equipment designer. For instance, the modified spreader just mentioned works well on a 450-horsepower Stearman, but it probably would not be suitable for any other type of plane and perhaps not even for a Stearman of lesser power. Furthermore, the spreader was designed for the distribution of 30/40-mesh granules and probably would be less efficient with those of 20/30 or 30/60 mesh.

With sprays, which are of more widespread interest, the design and calibration of aircraft equipment present problems of similar complexity. Height of flight and the length of the boom are the primary influences on the width of swath produced. The coarseness of the spray is affected by the speed of flight and the angle of the nozzles. Only through flight tests with each type of installation and each type of aircraft can the effect of these influences be measured.

Some standardization in aircraft will permit and encourage more uniformity in dispersal equipment, and fortunately the manufacturers of new agricultural aircraft are projecting their skill beyond the field of aeronautical engineering and are designing and producing application equipment suitable for the type of plane they propose to market. Nevertheless, as new materials are developed expensive experimental work still will be required.

An interesting example of a problem faced by equipment designers as a result of improvements in agricultural chemicals occurred not long ago in connection with the control of grasshoppers. As late as 1948, almost all grasshopper-control work was done by applying a wet, somewhat cohesive bait. It was difficult for aircraft to handle, and the swath obtained was very narrow. In 1949 a dry bran bait was first used on a large scale. This was much more suitable for aircraft application, for it flowed readily and covered a wider swath, but discharging it from the large aircraft then needed for this work presented unusual mechanical difficulties. In 1951 oil sprays came into general use. They were much more adaptable to aircraft application and gave a still wider swath than dry baits, but required an entirely different kind of dispersal equipment, and consequently a great deal of experimental work.

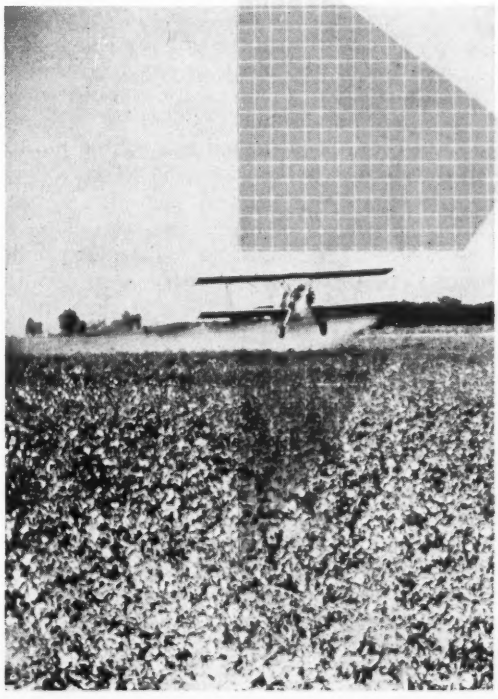
Here, within a period of four years, the transition was made over three different kinds of material and three different kinds of equipment to control one insect. None of these changes could have been foreseen far in advance. It is quite possible that equally radical changes may be required of application equipment in the field of cotton production. Tomorrow's cotton pest control may create equipment demands equally as complex as some other recently encountered—dispersing irradiated flies for screwworm control or eradicating the Mediterranean fruit fly with bait sprays and granulated insecticides.

Now let us consider ground-application equipment and then matters common to both aircraft and ground equipment.

Great strides have been made in progressing from dust carts to power dusters of considerable precision and capacity. Air-blast machines, which I like to categorize as spray blowers, mist blowers, and fog blowers, have replaced high-volume, high-pressure sprayers in many areas; boom sprayers have replaced dusters except for some specific purposes; and seeders have been converted to granule applicators. Here again, the rapid appearance of new chemicals in various forms complicates the design of equipment for applying them. Some are highly corrosive, some abrasive, some dangerous to man, and some dangerous to crops near those being treated.

The boom-and-nozzle, low-pressure, low-volume sprayer, now almost as common as the plow, has several distinct attributes, not the least of which is that it permits the spray to be directed to any part of a plant, and even different proportions to different parts of plants, if desired. However, when we see the ends of long booms whipping fore and aft as they are moved over rough fields, we cannot help wondering how efficient some of them actually are. Certainly under such conditions some plants receive much more spray than others, resulting in poor overall control or a waste of material or both. Under some tillage practices the remedy for this situation is not readily apparent.

The mist blower has the advantage of using high volumes of air and low volumes of liquid, its nozzle



orifices are larger and do not clog so readily, and the dispersal pattern is ample enough to give a good overlap with a minimum of spotty deposit. Under some conditions this type of machine has effectively replaced even the row-crop boom-and-nozzle sprayer. Much remains to be done in designing air-nozzle configurations suitable for the treatment of some crops, but from the evidence available it appears that the air-blast principle for applying sprays has a promising future.

The use of granulated pesticides will require much better equipment than is now available for its application. This is especially true of broadcast treatments where thorough and uniform coverage is required. Converted seeders have applied such materials with reasonable success, but often the uniformity of deposit is adversely affected by slight winds. Moreover, along hillsides the distribution may not be good. Here again, a single- or multiple-nozzle air-blast machine may prove to be a good solution.

Common to both aircraft and ground equipment are components such as tanks, hoppers, pumps, agitators, valves, hoses, booms, screens, and nozzles. The design and arrangement of these components, as well as the material of which they are made, affect their suitability for any given job. Consideration also must be given to the type of chemical they may be required to handle.

The current complex of chemicals accentuates the problem of corrosion and abrasion. A five-year cooperative study of this subject by pesticide and application equipment manufacturers and the U. S. Department of Agriculture reveals that tanks are the most common source of complaint. Accumulations of rust and scale are abrasive and tend to plug screens and nozzles. Tanks made of stainless steel or polyester plastic and fiber glass are resistant to a wide variety of chemicals, but tanks of some other materials give fairly satisfactory service if they are cleaned frequently and kept dry when not in use. Metal tanks coated with plastic and fiber glass have also proved durable and trouble-free. Also coatings of heat-cured phenolic and epoxy resin have shown good resistance to pesticides and solvents.

The pump, the heart of the spray system, has been the subject of much research. The requirements are rather complex. Pumps must handle solutions, emulsions, and abrasive suspensions, they must be reasonably impervious to the action of solvents and other chemicals, and their capacity must range from less than 1 gallon per minute for some row-crop sprayers to more than 200 gallons for large aircraft. In general, where high pressures are not required, the centrifugal pump has proved the most satisfactory. It has a wide capacity range and is fairly resistant to abrasives.

Other types of pumps that offer some advantages are the diaphragm pump for abrasive suspensions and the hose pump for liquid fertilizers and soil fumigants where low pressures and low discharge rates are suitable.

In the valve family the most troublesome member is the check valve. In the use of herbicides and in all aircraft work leaky nozzles can result in many difficulties. With aircraft in particular the dribbling of nozzles during turn-arounds or ferrying can destroy crops or wildlife or build up harmful residues. Some check valves on the market operate well with materials free of foreign matter, but even they are not foolproof. Leakage can be reduced by the introduction of small bleed lines between the boom and tank, bypassing the pump, to relieve pressure in the boom when the main valve is shut off. However, the best system employs a positive shutoff valve at each nozzle.

The deterioration of hoses has been troublesome in the past, but the use of synthetic rubber compounds such as Buna N has greatly reduced problems resulting from swelling, softening, and blistering.

In the design and orientation of booms, improvement continues to be made. With ground equipment the so-called dry boom is finding favor in some areas. In this system the liquid is carried in flexible tubing attached to a structural boom. Among other things, this simplifies rearrangement of nozzles and permits diversity in the design of the boom itself. In aircraft are the added considerations of air resistance or drag, greatly increased flow rate, and the effect of aircraft configurations on the deposit pattern. Booms located directly behind the wing's trailing edge have been found to reduce drag and are beginning to be used commercially. Long booms introduce spray into the wing-tip vortices. The resulting swirl of the spray may increase swath widths, but it may also produce a very uneven deposit or uncontrolled spray drift.

Last among the equipment components comes the nozzle. The hollow cone offers some advantages over the flat spray nozzle. It produces a slightly more uniform atomization and wears less when used with abrasive liquids. More important, perhaps, than drawing a distinction between types of nozzles is to distinguish between the materials of which they are constructed. Erosion, causing overdosage and pressure drop, can be retarded significantly by the use of hardened stainless steel, ceramics, and tungsten carbide. The use of such materials may not always be warranted, but for applying wettable-powder suspensions and sprays containing dirty water they have distinct advantages.

It is hoped that this brief review of equipment, based on findings of the Agricultural Engineering Research Division and the Plant Pest Control Division of the U. S. Department of Agriculture, will indicate the necessity of increased developmental work. Closely allied with such a need—in fact, an integral part thereof—is the need for continuing studies on treatment methods. For example, existing laboratory equipment can produce spray drops with a diameter of either 500 or 33 microns, but the former applied at 2 gallons per acre on a flat surface will deposit only 18 drops per square inch whereas the latter will desposit 64,000 drops. The best answer usually lies somewhere in between these two extremes and the determination of that inbetween point may have considerable bearing on the effective-

ness of the spray and on the amount that must be applied.

A further study of methods may reveal that for a certain purpose granulated material applied to the soil gives better results than spray applied to the foliage. Hence, the most efficient spray machine may give poorer *end* results than a mediocre granule applicator.

In addition to a continuing study of methods, requiring the cooperation of engineering and biology, closer attention must be given to the subject of residues. Not so important, perhaps, to the cotton grower as to growers of fruit, vegetables, and livestock, he may nevertheless be growing crops with low residue tolerances adjacent to his cotton fields or he may be involved in the risk of post-harvest grazing or the feeding of gin trash.

Thus, equipment with a high standard of precision will be required to an increasing degree in the future. Engineers can design such equipment and, as revealed in these conferences and in reports of other fields of interest, they can design machines that will perform almost any function. However, in agricultural mechanics there are economic limitations and also limitations in trained manpower. Furthermore, applicator machines and methods must be relatively simple—for, as we all know, the number of persons who will adopt them is likely to vary inversely with their complexity.

This future we are discussing, which calls for precise, simple, flexible, ever-changing application equipment, is indeed a challenging—yes, even an exiciting—future. And it is a future filled solidly with gratifying dividends. ▲

Black, D. T., "Effect of Pesticides on Application Equipment," U. S. Dept. Agr. ARS 42-6: 5 pp. 1956.

U. S. Dept. Agr., "How To Spray the Aircraft Way." Farmers' Bull. 2062: 32 pp. 1954.

This article is adapted from a speech given at the 11th annual Beltwide Cotton Mechanization Conference, Shreveport, Louisiana, October 3, 1957.

BRIGHT OUTLOOK FOR PESTICIDES PREDICTED AT ANNUAL CACA MEETING

A BRIGHT future for the pesticide industry in Canada was predicted during the 5th annual meeting of the Canadian Agricultural Chemicals Association.

D. K. Jackson, market research manager, Monsanto Ltd., and J. J. Parchelo, Chief, Metal & Chemical Products Section, Dominion Bureau of Statistics, spoke about the tremendous growth of pesticides in Canada over the last few years. Jackson said that in 1947, the total sales of pesticides in Canada was $7,200,000, whereas in 1956 it had grown to $24,565,000. He further stated that he would not be surprised if the sales doubled the $24 million figure within a relatively short number of years. Mr. Parchele explained how the Dominion operated their statistical reports. He reported at the present time there are 2850 products and 600 firms registered in Canada, with quite a number of those being registered during the last few years.

Products were featured in two of the talks—Gordon A. Brandes, Rohm & Haas Co., Philadelphia, spoke on "Miticides" and Dr. Curt Leben, Eli Lilly & Co., Greenfield, Indiana, on "Gibberellic Acid."

Kelthane, (1, 1 - bis (chlorophenyl)-2,2,2- trichloroethanol), is a very effective new miticde which possesses rapid initial killing action and exceptionally long residual toxicity said Brandes. It is especially toxic to motile forms of mites and is ovicidal to some species. Kelthane has given effective control of a very wide range of mite species and of populations which have become resistant to the organic phosphates and other miticides. It is essentially nontoxic to insects including honey bees. Kelthane is safe on all crops under most environmental conditions.

Kelthane has a comparatively low order of mammalian toxicity, being about one third as toxic as DDT. Residues of Kelthane are very persistent, but never exceptionally high. Kelthane has been registered for commercial use on certain crops in Canada and the United States in 1957.

The product is available as a wettable-powder, an emulsion concentrate and in dusts.

Dr. Leben reviewed a number of outstanding results obtained from the use of gibberellic acid (See FARM CHEMICALS, May and October) on vegetables and flowers.

He also stated that the problem of production of gibberellic acid was a thing of the past and that satisfactory deliveries can be made.

As for its future use, he felt that at the present time its greatest use will be for greenhouse work and by housewives on flowers and shrubs. Leben also gave the impression that there was a possibility of Canada's agricultural area extending ultimately into the northland. Two properties, the hastening of seed germination and its growth stimulation, may someday enable crops to mature in cold areas where agriculture now is impossible.

Commenting on the cost of the acid, he said that while it is expensive now, about $4500 per pound, the cost would come down as use increased following the usual pattern of other chemicals that were burdened with a high initial cost.

A more generous farm credit policy and diversification of production may improve Canada's depressed farm economy according to the Canadian

Minister of Agriculture, Douglas Harkness. He suggested that a type of credit policy similar to loans accorded under the Veterans Land Act, may be used to help farmers.

The agriculture minister felt the wheat surplus in western Canada could be obliviated if farmers could use part of their wheat acreage for sheep and cattle raising. He felt that the United States would provide an excellent market for beef for the next two years and sheep raising would reduce the extensive import of mutton and wool.

The annual banquet featured a talk by Mme. Henri Vautelet, C.B.E., of the Canadian Association of Consumers. Mme. Vautelet spoke on the importance of women in Canada and the tremendous potential buying power they represent. She felt that women should be told more about fertilizers and pesticides and indicated that they are not fully acquainted with the contents of the various packages. She recommended that manufactures consider the housewife in a more serious light, and put up satisfactory sized packages for her.

In the President's annual address, G. E. Willan reported on the progress of the association which now has 38 active members and 11 associate members. He also praised the work of Michel Chevalier, general manager of the association. Chevalier was appointed general manager at last year's convention.

M. E. Ward, Du Pont Company of Canada, Montreal, was elected president for the coming year; and the newly elected vice-presidents are J. H. Elliott, Rohm & Haas Co. of Canada, West Hill, Ontario, and S. R. Steovel, North American Cyanamid Co., Toronto. The new secretary is D. D. Stokes, Monsanto Canada Ltd., Montreal; and G. E. Flemming, Natural Products Corp., Montreal, was elected treasurer. The new directors are, ex-officio, G. E. Willan, Niagara Brand Spray Co., Ltd., Burlington, Ontario; P. E. Redman, National Grain Co., Ltd., Winnipeg, Manitoba; W. M. Karn, Electric Reduction Co. of Canada Ltd., Ontario; W. H. Silversides, Interprovincial Co-operatives Ltd., Winnipeg, Manitoba; J. K. Brown, Sherwin-Williams Co. of Canada Ltd., Montreal; J. S. Wilson, Dow Chemical of Canada Ltd., Toronto. ▲

The IMPACT of Farm Chemicals on Agricultural Engineering

By
Dale E. Wolf
Grasselli Chemicals Department
E. I. du Pont de Nemours & Company

BIOLOGICAL chemicals as we think of them today include weed killers, insecticides, fungicides, seed treatment materials, growth stimulants, fertilizers, and feed supplements for poultry and livestock. The history of the development of any one of these chemicals is an interesting and fascinating subject in itself.

For a good many years the chief impact of these chemicals on the agricultural engineering profession has been the demand for equipment which would place these chemicals where they are needed to do the job. In the chemical industry we have tried various kinds of formulations—solutions, emulsions, wettable powders, dusts, slurries, pellets, and even volatile liquids such as anhydrous ammonia where the vapor pressure of the chemical is utilized in moving it from the applicator to the crop row. Chemical engineers have worked with agricultural engineers in designing nozzles, airblast equipment, spray pumps, soil injectors, and a host of other devices for applying chemicals. From an engineering standpoint, perhaps the problem has become more complex over the year, but basically it has been the same problem. Until recently there has not been much indication that chemicals would demand any revolutionary concepts in the application of agricultural engineering in the production of crops, livestock, or poultry.

For example, we have always taken it for granted that certain crops should be sown in rows. So all the machinery used from the breaking of the land right through harvest has been designed for row culture. Now probably the original reason for row culture was to provide space between the plants so that a man could walk through and hoe out the weeds. As the farmer progressed from the hand hoe to horse-drawn and tractor-drawn cultivators, row culture was still the easiest and most practical design for his fields, and provided the best system for mechanical weed control. Now, however, chemical weed control has

FERTILIZER SURVEY SHOULD AID NPFI AND THE INDUSTRY IN MAPPING FUTURE

QUITE a bit of excitement is being generated in the fertilizer industry because of the nature of the results of a survey run by National Analysts of Philadelphia for the National Plant Food Institute.

The results of the study will undoubtedly influence the NPFI organization in its market expansion work and will perhaps influence many member companies in their individual sales and educational programs, both public and private.

The survey originally was intended as a guide for the proposed expansion program of the institute (and now that the expansion program is a reality it will be used as such). But even at the final decision stages several foresighted members of the institute felt that such a survey would be of value, exclusive of expansion — so it was decided to go ahead.

What did it accomplish? Who knows, but from all indications it might well be the basis for a revolution in the sales programs of many members of the Plant Food Institute.

Basically the National Analysts group started out with this premise: A study on farmers' attitudes

(*Continued on page 44*)

progressed to such an extent that the day may not be far off when crops will come through the entire season without any weed control operation being necessary. Then it may be more productive to sow what we now call row crops in some other pattern. And perhaps instead of row pickers for crops like corn and cotton we will have combines as we now have for so many crops which are sown broadcast.

From the point of view of applying the chemical weed killer we will still have to have equipment which will put the weed killer where we want it. And we may have to do this with even more precision than we are doing now. But look at the impact that this one chemical development might possibly have on all the present concepts for designing agricultural field machinery.

In the control of insects and plant diseases, we are moving more and more toward the concept of systemic protection, which is really the creation of immunity by chemicals. We hope to see the day when we can treat seed or young plants once to obtain protection for the entire season. This, of course, will be a radical departure from the present day concept that you have to have sprayers or dusters and go over the fields frequently during the growing season to keep new growth protected.

In fertilization, I am sure many of you are familiar with the application of fertilizers in soluble form in irrigation water. Even in the humid areas of the southeast, farmers are coming to depend more and more on a controlled water supply through irrigation rather than the haphazard rainfall supplied by nature. Application of fertilizer in irrigation water is highly efficient, and the rate of feeding various elements can be regulated to fit the exact stage of growth of the crop.

Many of the chemicals which we would like to use for soil treatment are quite expensive. Therefore, we want to treat as small a portion of a field as possible and prolong the effect of the treatment as long as necessary. Here we are still in the row culture phase ourselves. To control fusarium root-rot in tomatoes, for example, we are experimenting with treatment of a 12-inch band of soil straddling the tomato row in the field. Once that band of soil is treated we want to be sure that that treated soil remains undisturbed in contact with the roots of the tomato plant for as much of the season as possible. If we treat the soil at planting time, the normal operations of opening up the planting row and then bringing the soil back around the base of the plant or over the seed dilutes the effectiveness of the chemical treatment. In fact it may introduce new contamination. So in order to get the greatest effect from the chemical treatment of soil, we may have to redesign some of our planting equipment so that it does not move the soil around too much.

Turning now from crops to livestock and poultry for a moment, the effect of chemicals on engineering probably cannot be separated from many other advancements which are taking place, but I think here too we have seen only the beginning. The use of nutritional supplements and medicines in feed has made it more and more possible to regard herds and flocks as living factories for the production of meat, milk, and eggs. Especially in the production of milk and eggs we have seen revolutionary changes in the buildings and equipment in recent years. The pen stable and milking parlor management of a dairy herd is considerably different from the old stanchion-type of dairy barn. Batteries of laying hens in cages seem to promise many flock management advantages over older methods. Broiler production perhaps comes closest of any agricultural operation to the pattern of a manufacturing industry.

We have discussed the possibilities of new kinds of chemicals that might solve our present problems more

(*Continued on page 44*)

Agricultural Engineering

efficiently. These problems basically are how to produce maximum yields at minimum cost per unit of produce. An important consideration with which all of us are faced today is that of future food supply. Thinking people all over the world are beginning to concern themselves with this question. One of the central considerations in this problem is the fact that the bulk of the world's present food supply is now being grown on only about two per cent of the earth's surface, and that it appears that this percentage cannot be greatly increased by new methods, such as erosion control, irrigation, etc. Of course, basic research is being done on the possibility of utilizing solar energy to raise simple plants such as algae for food, and marine biologists are continually assessing the possibilities for increased production of food from the seas. However, after reviewing some of the revolutionary schemes which have been proposed, one is left with the thought that the demands which may be placed on the world's food supply through future population growth will be met, not by radically new schemes, but by step-wise progress through teams of biologists, agricultural engineers, and chemists such as those who have provided the advances of the last 50 years. It is now predicted that the population of the United States will pass two hundred million in 25 years. Beyond that it is anyone's guess, but if birth rates continue their present trend, it is quite likely that our population will reach three hundred million within the life span of many of you present.

The challenge to feed these numbers can be met in three ways. One way is to resign ourselves to a more restricted and less interesting diet. The second approach is to increase the proportion of our people engaged in agriculture. The third hope for the future is to rely on the advance of technology, including, of course, advancements in the use of chemicals to increase yields. U. S. Department of Agriculture representatives have estimated that if all of the improved farming practices now available were applied on all American farms, an increase in production of about 20 per cent might result. Beyond that point, the country must depend upon continued research to fill its future needs.

The use of pest control chemicals could never have reached the present state without agricultural engineers, chemists, and biologists working as a team. We need, however, even closer cooperation in the future to take advantage of the undoubtedly revolutionary changes that will take place within the next few years. ▲

Fertilizer Study

toward fertilizer and fertilization designed to determine the factors which influence farmers to use or not to use fertilizer.

The complete study is based on a national probability sample, with the sample being separated for purposes of analysis into the South, Middle West, Far West and the Northeast. The sample was a random block based on the national sample for agriculture. Two restrictions were imposed as to characteristic of farmers to be interviewed. One, only farmers with farms of 100 or more acres of total land were eligible; and two, the information was to be secured from the person making the decisions for the farm. (In essence, this second restriction eliminated the sharecropper, important in the South mostly, and non-managing tenant from the sample).

This information was collected by interview by trained enumerators on a questionnaire developed by National Analysts in cooperation with staff and members of NPFI.

After the questionnaires were collected, trained and experienced agronomists from NPFI member companies met in Philadelphia and classified the questionnaires as to whether the farmer was a high, medium or low user of commercial fertilizer. This classification was based on local conditions, local usage and local recommendations. Because of this extensive breakdown it should provide a useful tool in future analysis.

Keeping in mind that the basic premise of the survey is to determine what influences a farmer to buy or not to buy fertilizer, Dr. Moyle S. Williams, chief economist of the Institute, said about some of the answers they were getting to questions, "We are impressed with the type of information we are getting from the survey. When the final results are tabulated, they will be analyzed and cross-checked statistically, and not until this has been done will specific information be released."

When will the complete reports be available? Well, that is a decision that will be handled by the committee who handled most of the work for NPFI. The chairman is W. E. McGuirk, Jr.; other members are W. F. Price, Clyde Marshall, Tom Ware and Dean Gidney.

● B. B. Fall, the Hubbard Hall Chemical Co., is shown presenting a gold watch to Walter E. Meeken, vice president, Consolidated Rendering Co., on behalf of the Institute, at the annual New England Fertilizer Conference last month in Melvin Village, N. H. Meeken was presented the watch for his many services to the fertilizer industry and New England agriculture. Also shown in the picture is Edward R. Jones, The Hubbard Hall Chemical Co. and a member of the NPFI board. Jones served as toastmaster of the evening banquet.

TO PROVE A POINT

WHAT does a company do when suddenly its product is not on the recommended list any more? Or if you hear the word "resistance" in connection with your product?

Well, you can go olive fishing, or jump in a lake, or a number of similar things, but if you have some facts that don't agree with the general concensus of opinion you can make an effort to prove you're right. And because they felt they were right, Hercules Powder Co. put on the biggest demonstration of cotton insect control ever seen in the Tri-State Delta.

During the fall of 1955 and again in 1956, reports of failures to control the boll weevil with commonly used insecticides in Louisiana were made by farmers and research people.

As a result, in 1956 all the chlorinated hydrocarbons including toxaphene were restricted and in 1957 were removed from the Louisiana recommendations for boll weevil control over most of the state.

It was in this same period, 1955 and 1956, however, that records of some farms using toxaphene or toxaphene-DDT mixtures for control of the weevil showed excellent results had been obtained. Furthermore, research conducted at the Red River Experimental Station in the same period also showed excellent yields could be obtained with a toxaphene-DDT formulation.

Considerable time and effort was put into the selection of the fields involved in the program. Fields were selected in each of the state's localities where boll weevil problems were especially significant. All of the fields have a historical record of boll weevil infestation.

Farmers selected were those interested in a more economical insect control program, lower late-season infestation counts, and adequate protection for their livestock, other farm crops, and applicators. In addition they all possessed suitable equipment and expressed a willingness to make applications according to Hercules' suggestions.

The over-all problem indicated a need for an early season control program that would not only reduce overwintering weevils, but would also control fleahoppers, thrips, plant bugs and other insects.

The program began as soon as the cotton came up to a stand with two applications of approximately a pint of toxaphene per acre, at seven-day intervals, to control thrips. Following these two applications, four applications of toxaphene of one quart per acre, at seven-day intervals, were made to control overwintering weevils, fleahoppers, plant bugs, and other insects which attack cotton early in the season.

These latter applications were timed to start at about the time the cotton was in the six to eight-leaf stage, or when the plant starts setting tiny squares and continued up to the date that emergence records show that 95 per cent of the overwintering weevils have emerged. On some of the farms a final early-season application of a 2-1 mixture was used to take care of the spring brood of bollworms, which frequently attack cotton in Louisiana.

Good control of all these pests was indicated from the excellent early crop that was set in all locations. Fields which adjoined or were in the same locality that were not treated failed to set or only partly set an early crop.

Late-season control for the boll weevil was started at most locations in the early part of July. The timing of these applications was based on a rising infestation; or in other words, when the first generation weevil was emerging and starting to feed on squares. Generally speaking, these applications were started on or before the time that ten per cent of the squares were punctured. A mixture of toxaphene-DDT, two pounds of toxaphene to one pound of DDT, was used in all of the late-season applications.

The 2-1 formulation in late season, applied at 4-5 day intervals, gave excellent boll weevil and bollworm control as indicated by the infestation records.

This work was carried out during an unusually wet year in which numerous heavy rains and showers

(Continued on page 48)

HUSTON, CULVER FERTILIZERS, INC.

Successful Switch To Liquid Fertilizers

● *ONE EASTERN MANUFACTURER WITH THE FORWARD LOOK IS MAKING A SUCCESS PIONEERING PLANT FOOD'S GREATEST ADVANCEMENT.*

by PETER C. CROLIUS

HUSTON, Culver Fertilizers, Inc., has produced plant foods since 1890. Located at Seaford, Delaware, the company is centered in a highly intensive agricultural area. Until this year, the company has concentrated fertilizer sales in eight counties in Maryland and Delaware.

These eight counties, according to the Census of Agriculture, sold a total of $130,347,000 worth of farm products in 1954. There are 11,600 farms in the area served by Huston, Culver. Farms average 155.6 acres. Sandy loam soils predominate on the flat terrain which characterizes the Delmarva Peninsula. 157,822 tons of fertilizer were sold in those counties in 1954. Total agricultural acreage is 1,621,000 acres.

Corn, of course, is the outstanding commodity. Wheat, oats, barley are secondary standbys. Soybean acreages have been gaining steadily. A high proportion of cropland is planted to vegetable crops. Huston, Culver sells to cucumber, cantaloupe, string bean, lima bean, tomato, watermelon and asparagus growers.

In a sense, Huston, Culver has been a pioneer ever since its birth 67 years ago. It was one of the first fertilizer manufacturers on the peninsula. It pioneered bulk spreading of dry materials, and the company was the first in that area to sell nitrogen solutions.

The present owners are George and Dallas Culver, sons of the company's founder. Dallas, the elder, handles administrative duties while George heads up production and distribution. Huston, Culver employs five salesmen, a plant foreman, and 15 laborers, exclusive of those employed by Cooper-Merriken, northern district distributors.

Much of the success of the company is due to a combination of vision and a series of fortunate

Mixing is a one-man operation.

circumstances. Many materials are shipped by water right to the door of the plant. Seaford is on the main line of the Pennsylvania Railroad's Cape Charles Route. Huston, Culver's eight country spread is laced by hard surface roads. New York markets are a scant 200 miles away, Philadelphia markets only 110, and Washington and Baltimore markets are less than 100 miles from Seaford.

An article in *Farm Journal* on complete liquid fertilizers first caught George Culver's eye. That was in 1954. A year later he experimented with mixing dry fertilizers with water. Fascinated by what he observed, heard, and read, Mr. Culver went to Illinois and Indiana to study first hand what liquid manufacturers were up to. He noted particularly what farmers thought of complete liquids.

Convinced that it would be a go in Delaware and Maryland, George Culver drew up plans for the Delmarva Peninsula's first complete solutions plant. (Today, the Huston, Culver plant remains the only one of its kind in that area.) Ground was broken late in 1955. With local financing and labor the plant went into operation at the tail end of the 1956 application season.

Huston, Culver's total investment in the liquid plant and equipment is confidential, but the owners agree that the figure runs close to $75,000. "It would have cost us a lot more if we'd contracted to have the whole job done for us, but we saved a lot by doing it ourselves," says George Culver.

How's business? That too is confidential since there are seven other manufacturers in the eight-county area. But the Culvers admit that complete liquids will comprise about a third of the company's total business in 1958 . . . after only two full seasons! Dallas Culver's statement that "farmers are reponding to them (solutions) very well" is perhaps the understatement of the year.

The Culvers could hardly agree with an article in a recent national farm magazine which said, "Any farmer with $50,000 can get into the liquid fertilizer business." The brothers are quick to point out in retrospect that it was far from a bed of roses. They found out the hard way. They had to learn by experience that solutions will salt out at certain concentrations. They found that all problems aren't in production, that distribution can be the biggest headache.

What do customers think of complete liquids? "We haven't had one farmer who didn't think liquids were better than dry fertilizers," says Dallas Culver.

Elmer and Wilson Wheatley, farmers at Grasonville, Md., switched over from dry fertilizers to Huston, Culver liquids. Says Elmer Wheatley, "I'd rather have 300 pounds of liquid than 500 pounds of dry. Liquids go right to work, and they're so easy

Will dry fertilizers become obsolete?

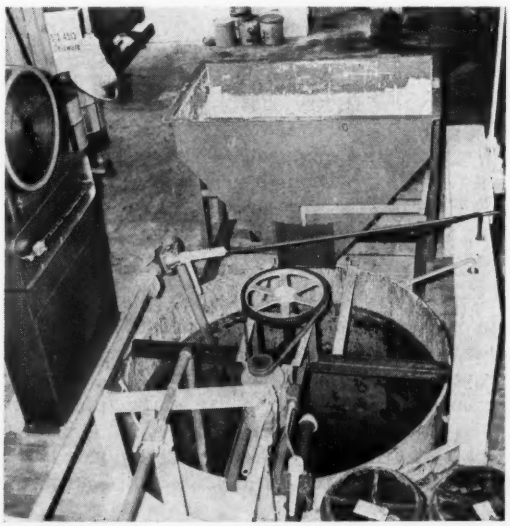
Probably not. Yet we can't overlook the fact that more and more customers of dry materials are being converted each year to the use of liquids. Nowhere has the trend to liquids been more forcefully demonstrated than in the central states. Barely four years ago, complete liquids (not to be confused with nitrogen solutions) were virtually unknown to the commercial market. Today, central states boast no fewer than 123 plants producing complete fertilizer solutions. At the time of this writing concrete is being poured for three more plants in that area.

It is quite conceivable that by 1965 liquid fertilizers of all types will amount to 50 per cent of the total plant food sold in the U. S. Manufacturers of production and application equipment have not kept apace with demand thus far but are likely to meet the necessities of the industry by 1959, thus making the rise of liquids' popularity even faster.

While liquid plants have boomed in the central and western states, their growth has been surprisingly slow in the East. However, at least six plants are in operation on the East Coast from North Carolina to New Jersey. Two plants are in operation in Mississippi with one now abuilding; at least one is now under construction in Alabama.

On these pages is presented the story of one eastern liquid manufacturer. Doubtlessly this same story has been repeated countless times in other areas. Yet because the Huston, Culver operation is in the East, because the complete liquids business is booming everywhere except the East, and because the East can expect a mild boom in complete liquids in a short time, these facts are made known. P.C.C.

The "homemade" 150-ton mixing unit.



Oldest, older, and new H-C operations.

to apply. I think they're the coming thing." The Wheatleys till 1100 acres on the shore of Chesapeake Bay in a corn-soybean-wheat-barley operation.

Not counting nitrogen solutions, Huston, Culver now offers eight complete liquid mixtures. Or they'll make up any analysis a farmer wants. Prices are competitive to dry fertilizers, and "in our operation dry fertilizers have yet to lose a ton of business to liquids," adds Dallas Culver.

Because of extremely dry growing conditions in 1957, Huston, Culver was given extraordinary proof of the efficiency of its liquid fertilizers. A carefully controlled corn-fertilizer experiment was established on 20 acres. Ten acres received 500 pounds per acre 5-10-10 at planting in dry materials. The other ten arces received the same dose of liquid plant food. 76.6 bushels were taken from each liquid-treated acre while only 39.5 bushels an acre came from dry fertilizer treatment. The Culvers are loathe to release these figures since in their wide contrast they may appear rigged.

George and Dallas Culver

Most H-C application and distribution equipment is as homemade as the plant itself. At present they have six trucks, six trailer spreaders which double as nurse tanks, and two tractors. "We didn't want to get into the application equipment business," says George Culver. "But to sell our material, we were forced into it. We've sold about 30 liquid attachments for planters so far. But we're hoping that machinery dealers will stock parts and equipment before next season."

The Huston, Culver solutions plant is housed in a sheet steel building no larger than a farm machinery storage building. One end is devoted to the five-ton capacity mixing unit. Two storage bins occupy the other end which fronts on a railroad siding; each bin has a capacity of 1½ carloads of muriate of potash or other dry materials. Outside there are storage facilities for 34,000 gallons of liquid nitrogen (either for straight nitrogen applications or for solutions mixing), a tank for storing 5000 gallons of phosphoric acid, and tanks for storing 150 tons of finished product.

Future plans by the Culvers include entry of liquid fertilizers into the home lawn and garden market, entry of liquids into highway seeding and maintenance operations, and expansion of sales into counties heretofore untapped. Too, they'll explore more fully the feeding-through-irrigation business. Experiences in 1957 indicate that there's a great sales potential in irrigation.

Say the Culvers: "We've been in the complete solutions business only one full season and part of another. Now our products are known . . . especially after this year's drought. Next season we plan to get up and go full steam ahead. Frankly we're counting on our customers to be our best salesmen. Unit for unit our material is the equal of any dry fertilizer. Form against form, we have indications that liquids are far better than dry materials. We're basing our plans on continued, rapid acceptance of liquid fertilizers. They look good from where we sit." ▲

Toxaphene Demonstration

occurred during the entire season. All applications, throughout the season, were made by the farmers with conventional equipment or by local aerial crop spraying operators under the farmers' supervision.

In addition to the fields included in the demonstrations, observations were made and records obtained on several adjoining fields. Several of these fields, treated with materials recommended in 1957, suffered severe damage from boll weevils and bollworms.

Without exception, all of the fields involved in the Hercules program matured faster, as compared with others in the same communities.

Was the program successful? Hercules people along with the nine farmers who participated in the program certainly think so. The farmers had a good crop made with estimated production running from 1½ to 2½ bales per acre. Cost of the control ran from a low of about $11 per acre to a high of about $23 per acre. The average was about $19.50.

Jack Timmons, farm director for KWKH in Shreveport, talked with Dr. L. D. Newsom, LSU experiment station, about the demonstrations. Dr. Newsom told Timmons that "without a doubt they have something in the toxaphene-DDT mixture" meaning that the mixture did the work. He reported they got the same results with their own experiments using the same mixture; however, he expressed a doubt to Timmons that the early start was necessary.

Hercules in doing this demonstration didn't set out to prove anybody wrong or to put toxaphene in a contest with other hydrocarbons; they simply wanted to prove that toxaphene and toxaphene-DDT mixture properly timed (including an early application) and correctly applied would provide good control at reasonable cost. They feel they accomplished this objective and they have at least nine Louisiana cotton farmers that agree. ▲

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Equipment & Supplies

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H. B. Scharbach, vice pres. of sales, and G. E. McMahon, exec. vice pres., examine the first drum to come off the line.

In a move to meet the rising demands of industry to have one supplier for the popular capacities of steel shipping containers, Vulcan Containers Inc. has expanded its production to include mass production of 55-gallon drums.

Effective in October, Vulcan began offering a full line of open heads and closed heads, 55-gallon steel drums, manufactured to comply with Universal Standard dimensions, to meet ICC and Uniform Freight Classification specifications. A variety of types and sizes of openings, fittings and plugs are available for the different style drums.

Vulcan will continue to produce a wide variety of smaller steel shipping pails, ranging in size from one to 15 gallons.

For information on the company's products,

CIRCLE 324 ON SERVICE CARD

NEW METHOD FOR COMPACTING CHEM. SALTS

Upgrading of fine mesh materials to a more marketable product is being accomplished by a continuous compacting process recently developed by Allis-Chalmers Mfg. Co.

The process first found successful application in the fertilizer industry where one compacting mill, two granulators and one screen can refine about 10 tons of potash per hour 100 per cent minus 28 mesh Tyler to a desirable 6 by 28 mesh Tyler with 60 to 70 per cent granulation recovery from the closed circuit.

Application of the compacting equipment is expected to widen rapidly. Three potash refineries are currently in production with the new process, along with two ammonium sulfate, one diammonium phosphate and a sodium nitrate producer, Allis-Chalmers reports.

LPG SYSTEM AVAILABLE FOR NEW CLARKLIFTS

A liquified petroleum gas fuel system has been made available as optional power on the new Clarklift line of fork trucks manufactured by Clark Equipment Co.'s Industrial Truck Div.

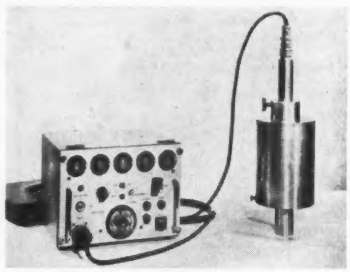
Components of the LPG system are interchangeable on all Clarklift models and incorporate the low maintenance features of Clark's earlier LPG equipment plus additional refinements. The LPG system requires minimum space and is installed so as not to interfere with any function of the fork truck. A flexible fuel line from the externally-mounted tank to the fuel filter permits opening of the engine hood without disconnection of the fuel line.

Safety features include a 375 psi relief valve built into the tank, valve mounted excess flow check valve, quick disconnect coupler with check valves in both male and female fittings, solenoid valve, hydrostatic relief valve, fused vacuum switch and a tank guard.

Complete specifications of the new LPG equipment can be had by

CIRCLING 325 ON SERVICE CARD

TWO MINUTE TEST OF SOIL MOISTURE AND DENSITY



Nuclear-Chicago Corp. says its "d/M-Gauge" answers a long-felt need by modern agronomists for a simpler and faster way to determine the moisture content and density of various soils.

Simplicity of application and speed of measurement are primary advantages claimed for the new system. In contrast to the bulky equipment and time-consuming procedures required by conventional methods, a single non-technical operator of the portable d/M-Gauge can obtain accurate moisture or density determinations in two minutes—less than $^1/_{10}$th the time necessary with other systems.

A separate probe is provided for moisture or density determinations. The moisture probe contains a radioactive source of fast neutrons while the density probe contains a cesium-137 gamma ray source. Either probe may be used interchangeably with the same scaler. For more information,

CIRCLE 326 ON SERVICE CARD

SUPPLIERS BRIEFS

Baughman Manufacturing Co. has appointed Warner & Todd, Inc., St. Louis, as advertising counsel.

Chase Bag Co. appointments: John R. Hale and H. E. Dennie to midwestern and eastern regional sales director, respectively.

Union Bag-Camp Paper Corp. has received the Grand Award in the annual competition run by the Direct Mail Advertising Association.

FOR SALE: Dewatering Presses: Louisville 8-Roll 36", Davenport #2A, 1". Aluminum Tank: 24,000 gal. Ribbon Mixer: 336 cu. ft. Steel Tanks: 400 gal. to 9500 gal. Perry Equipment Corp., 1430 N. 6th St., Phila. 22, Pa.

FOR SALE: Baird Dryers, Model D-700, 4 x 30; Rotary Steam Tube Dryers, 4' x 30', 6' x 25', 6' x 45'; Heil Dryers, 8 x 24, 8 x 16 (Portable), also hammer mills, mixers, etc. Perry Equipment Corp., 1430 N. 6th St., Phila. 22, Pa.

CLASSIFIED ADVERTISING

NEW RATES . . .
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Help wanted, positions wanted, used machinery and business opportunities are now charged at only 15 cents per word, $2.50 minimum. Count box number as five words.

Display ads . . . $18.00 per column inch, minimum of one inch. Ads over the minimum are accepted only in multiples of one half inch.

For prompt results, send your classified ads to Farm Chemicals, 317 N. Broad St., Philadelphia 7, Pa.

Closing date: 10th of preceding month

FOR SALE: Fertilizer equipment and tornado damaged fertilizer plant at Fargo, N. D. Building has vertical columns, foundation, bin cribbing, warehouse dock. Equipment consists of drying, cooling and pelletizing drums, fans, dust collectors, Stedman mixer, I&C bagger, hopper system and scales, flowrators, bucket elevators. Keystone 150 hp boiler, two Tyler screens, one Link Belt vibrating screen, two payloaders, Yale fork lift and pallets. Acid and fuel oil tanks, several miscellaneous conveyors, 50 totally enclosed motors up to 40 hp. Contact Ted B. Schultz, Asst. General Manager, Peavey Elevators, 809 Grain Exchange, Minneapolis 15, Minn.

POSITION WANTED

Qualified agronomist desires position U. S. Nationality Austrian. Age 32. Doctorate degree from Hochschule Fuer Bodenkultur, Vienna. Experience: Three years—Agricultural Specialty Officer in the Austrian Productivity Center in cooperation with the American Economic Mission for Austria. Two years—Foreign Agricultural Specialist in large exporting European fertilizer factory. Languages: Mother tongue German. Fluent English, French and Italian (Simultaneous interpreter working for FAO, OECC, ECA). Good knowledge of Spanish, Dutch, Portuguese and Scandinavian languages. Address "650" care FARM CHEMICALS, 317 N. Broad St., Phila. 20.

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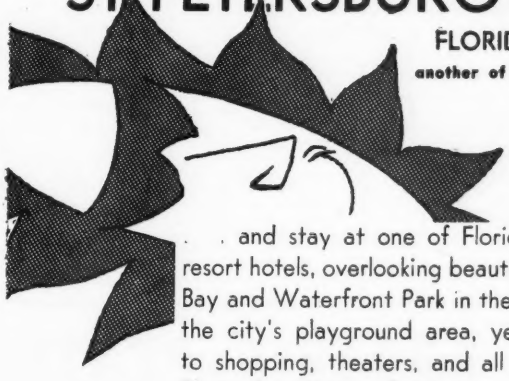

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CHEMICALS

NEW TYPE OF INSECTICIDE GETS EXTENSIVE TESTING

A new experimental insecticide manufactured by Union Carbide Chemicals Corp. introduces a radically-different type of chemistry to the insecticide field, the company reports. To be sold under the trade-mark Sevin, the insecticide is undergoing extensive tests by state and federal agricultural experiment stations across the country.

Composition of the product is in no way similar to established insecticides. It is an aryl urethane. Its chemical name is 1-naphthyl N-methyl-carbamate.

In tests to date, Sevin has controlled codling moth, red-banded leaf roller, apple aphids and plum curculio on apples, and pink bollworm, bollworm, boll weevil and other troublesome cotton insects. In addition, it is being widely tested on vegetables, with some experimental applications on forage, tobacco and ornamentals.

Toxicology work in progress indicates Sevin will rank as one of the safer insecticides.

YELLOW CUPROCIDE WITHDRAWN FROM MARKET BY ROHM & HAAS CO.

Discontinuance of its copper-based fungicide, Yellow Cuprocide, is announced by the Agricultural & Sanitary Chemicals Dept. of Rohm & Haas Co. The product, a finely divided form of cuprous oxide, was withdrawn from the market Nov. 1, according to Carlos Kampmeier, department head.

"While Yellow Cuprocide was useful to commercial growers over a considerable period, it virtually has been supplanted in recent years in agricultural sprays and dusts by our organic fungicide," said Kampmeier. "Dithane D-14, Z-78 and M-22 have demonstrated their superiority over copper-based materials in nearly all applications."

NEW CALCULATOR FOR THE FERTILIZER TRADE

A new type of calculator has been designed by the Phosphates and Nitrogen Div. of American

Cyanamid's New Calculator

Cyanamid Co. as an aid in determining quantities of phosphatic materials to be added when formulating various grades of mixed fertilizers.

The calculator is being distributed by the division's field personnel, and also can be obtained by fertilizer manufacturers who

CIRCLE 327 ON SERVICE CARD

WOOD SUGAR DERIVATIVE IMPROVES WEED KILLER

Tests have shown that small amounts of Maracarb X-1 will stabilize 2, 4-D Amine concentrates and prevent insolubilization and crystallization of the amine from aqueous solutions, according to Marathon Corp. The weed killer reportedly remains at full strength in diluted formulations and won't plug spray nozzles.

Maracarb X-1 is a complex mixture of the salts of lower molecular weight lignosulfonic acids and the salts of alkaline reversion products of hexoses and pentoses. Additional information is available by

CIRCLING 328 ON SERVICE CARD

MERCK GRANTS FOR GIBBERELLINS STUDY

Merck & Co., Inc., has established more than 30 new grants-in-aid at leading agricultural research centers to speed up investigative work on gibberellic acid.

The program, which supplements the company's own research, consists of funds, technical material and commercial-type formulations.

VELSICOL TO MAKE ETHYL PARATHION

Velsicol Chemical Corp. has announced that it will produce parathion (ethyl) at its Memphis, Tenn., plant. According to J. F. Kirk, vice president, production will start next month, at which time methyl parathion operations will be transferred to Memphis.

ORGANIC FERTILIZER MATERIALS

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BONEMEAL
COCOA SHELLS
TANKAGE

NITROGENOUS TANKAGE
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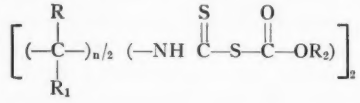
PATENT REVIEWS

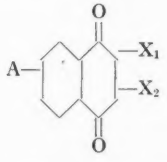
PESTICIDES

U. S. 2,796,376, issued June 18, 1957 to Oren F. Williams et al., and assigned to Food Machinery & Chemical Corp., discloses the use of alkylenebisdithiocarbamates as fungicides. The compounds have the general formula



where R and R_1 are hydrogen or an organic radical, R_2 is an organic radical, and n is a small integer.

U. S. 2,796,377, issued June 18, 1957 to Mario Scalera and Tsai H. Chao, assigned to American Cyanamid Co., discloses the use as fungicides of substituted naphthoquinone derivatives having the general formula



where X, and X_2 are each thiocyano or thiocyanomethyl radicals, and A is hydrogen or a nitro group.

U. S. 2,797,181, issued June 25, 1957 to Roger E. Drexel and assigned to E. I. du Pont de Nemours & Co., describes a pesticidal composition consisting of an aqueous solution of an alkali metal or alkaline earth metal salt and an alkali metal or alkaline earth monoethyl dithiocarbamate.

U. S. 2,798,022, issued July 2, 1957 to Howard L. Yowell and Anthony H. Gleason, assigned to Esso Research and Engineering Co., discloses the use of a butadiene-styrene copolymer as sticking agent for a fungicide.

The active fungicidal agent is N-trichloromethyl thiotetrahydrophthalimide. The polymer contains 75–85 parts weight of butadiene and 15–25 parts of styrene, and has a viscosity of 8.5 to 20 poises at 50 per cent N.V.M. The fungicide is applied as an aqueous emulsion.

U. S. 2,799, 612, issued July 16, 1957 to Philip H. Santmyer, assigned to Monsanto Chemical Co., describes a method of controlling nematodes and endoparasitic worms using chlorinated quebracho.

U. S. 2,799,613, issued July 16, 1957 to Hans-Karl Blodorn, assigned to E. Merck Aktiengesellschaft, discloses the fungicidal and bactericidal properties of dibromopentachloro-cyclohexane.

U. S. 2,799,614, issued July 16, 1957 to Victor Mark and assigned to Universal Oil Products Co., discloses the use as insecticides of 1, 2, 3, 4, 9, 9-hexachloro-1, 4, 4a, 5, 6, 7, 8, 8a-octahydro-5-alkoxy-1, 4-methanonaphthalenes.

U. S. 2,799, 615, issued July 16, 1957 to Albrecht Heymons and Willy Schnabel, assigned to Riedel-de Haen Aktiengesellschaft, discloses a process of preparing fungicidal 8-hydroxyquinoline compositions.

U. S. 2,799,616, issued July 16, 1957 to William K. Johnson, assigned to Monsanto Chemical Co., discloses the use as nematocides of aryl-1, 2-ethanediol cyclic carbonates.

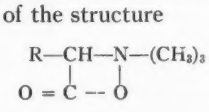
FERTILIZERS

U. S. 2,797,151, issued June 25, 1957 to Friedrich Schnur et al., assigned to Ruhrchemie Aktiengesellschaft, relates to the industrial production of nitric acid from gases obtained in the catalytic combustion of ammonia. The object of the invention is to improve the manner of oxidizing and absorbing nitrogen oxides.

U. S. 2,797,154, issued June 25, 1957 to Yrjo Kauko, relates to a method for using a liquid fertilizer from animal urine. The decomposition of the urine during storage is prevented by introducing carbon dioxide in an amount sufficient to lower the *p*H below 7. This may be done by adding CO_2 gas, or by liberating CO_2 from the bicarbonates naturally present by adding calcium salts such as calcium nitrate.

U. S. 2,797,986, issued July 2, 1957 to Fred P. Zirm, Jr., and assigned to E. I. du Pont de Nemours & Co., describes a process for producing an improved form of superphsophate fertilizer.

Phosphate rock is acidulated with sulfuric acid containing up to 0.05 per cent by weight of a carbon atom substituted-alkyl betaine of the structure



where R is an alkyl group (C10–16).

The advantages thus obtained are: (1) a pronounced reduction in the intensity of the acid fumes in the vicinity of the reaction; (2) the physical form of the resulting superphosphate may be varied from firm to friable by adjusting the concentration of the betaine; (3) the curing time of the pile may be reduced from 6 to 2 weeks; (4) the moisture content of the final product is reduced from 9 to 7 per cent; and (5) when the superphosphate product is blended by treatment with aqueous ammonia solution, it absorbs an increased amount of the ammonia.

No explanation is given in the patent as to why the addition of the betaine has these effects.

U. S. 2,798,301, issued July 9, 1957 to Herbert R. Antle and assigned to Phillips Petroleum Co., relates to a method for drying ammonium nitrate prills from the center to the outer surface so as to avoid entrapment of moisture within the prills.

PATENTS

U. S. 2,799,557, issued July 16, 1957 to Warren R. Seyfried and Sydney Atkin, assigned to Chemical Construction Corp., relates to the production of feed grade dicalcium phosphate, substantially free of fluorine and iron.

U. S. 2,799,562, issued July 16, 1957 to Sidney A. Bresler and assigned to Chemical Construction Corp., provides an automatically controlled gas compression for ammonia synthesis. ▲

MIDDLE WEST SOIL IMPROVEMENT COMM. ACTIVITIES MERGE WITH NPFI

A PLAN under which the activities of the Middle West Soil Improvement Committee of Chicago will be merged into the program of the National Plant Food Institute was approved Nov. 1 by the Institute's Board of Directors, meeting at Atlanta, Ga.

John A. Miller, president of the Institute in announcing the Board's action said that "The Middle West Soil Improvement Committee, of which Zenas H. Beers is executive secretary, will serve as the Midwest Regional Office of the Institute, with headquarters in Chicago, effective Jan. 1, 1958."

Members of the Middle West Soil Improvement Committee voted in favor of the plan to combine its activities with those of NPFI at a meeting in Chicago on Oct. 31.

Miller explained that the Midwest Regional Office will be one of four regional offices established under the Institute's expanded program in the field of research and education.

Said Miller, "We are pleased that Mr. Beers will be the Midwest Regional Director of the Institute, for his broad knowledge and effective work in research and education in the 13 midwestern states will be great assets in our nation-wide effort to focus increased attention on the importance of soil fertility in agricultural programming.

"It is the intention of the Institute to carry on the good work previously conducted by the Middle West Soil Improvement Committee and, in addition, the Institute expects to expand the Midwestern program through greater financial support. Among the many activities that will be conducted will be the annual meeting with Midwestern agronomists."

The Midwest Regional Office of the Institute will cover the following states: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin.

Beers is a native of Wisconsin, received his B.S. and M.S. at the University of Wisconsin. He was bulletin editor, Agricultural Experiment Station and Extension Service, Purdue University, from 1941 to 1947, and was executive secretary of the Middle West Soil Improvement Committee for 10 years prior to being named midwest regional director for the Institute.

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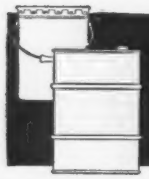

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PEST REPORTS

Presented in cooperation with the Economic Insect Survey Section. Plant Pest Control Branch, Agricultural Research Service, USDA.

FALL ARMYWORM ACTIVE OVER WIDE AREA

THE FALL armyworm, which has been one of the more active cereal and forage insects during the past several weeks, continued to cause concern throughout a wide area of the country during late September and early October. In Delaware the pest was common on corn throughout the state, being severe in late field corn in Kent county.

Outbreaks were occurring in many parts of Virginia, particularly the eastern and southeastern areas where small grasses, milo, peanuts, and soybeans were the principal crops affected. Local infestations were reported from both North and South Carolina while heavy damage to small grain was reported from parts of Georgia.

Grain sorghums, small grains, grasses and sweet corn were heavily damaged by the fall armyworm in various Alabama counties. In Lee county, Ala., some sweet corn was completely destroyed. Populations remained heavy in late September in several Louisiana parishes where millet, corn, sorghum, lawns and crabgrass were infested. Populations were on the decrease in Texas, but damage was reported from Lea county, N. Mex., where controls had been necessary.

Infestations were spotty in Oklahoma but newly emerged wheat in Jewell and Osborne counties, Kan., was being damaged to the extent that controls might be used. Heavy damage to late corn was continuing in Missouri with one to six larvae per plant. Damage to scattered fields of early seeded barley and rye was also reported. In Ohio the insect was abundant on late sweet corn throughout the state being the most destructive in the southern areas.

VELVETBEAN CATERPILLAR REPORTED FROM DELAWARE

The velvetbean caterpillar was reported from Delaware in late September for the first time. Soybeans were being attacked in several locations throughout the state and populations were light in lima and snap beans in southern Kent and Sussex counties.

Damage by the pest was also reported from Maryland which is very unusual. Soybeans were infested in Prince Georges and St. Marys counties with controls being applied in the former. Local infestations on soybeans were reported from both North and South Carolina, while in Georgia alfalfa and velvetbeans were also receiving damage. Populations up to 150 velvetbean caterpillars per 100 sweeps of a net were recorded from alfalfa in Tensas parish, La. The insect was also reported from soybeans in several other Louisiana parishes.

Although the spotted alfalfa aphid has not been as spectacular this year as in previous years, the pest has continued to show some spread.

In California the insect was taken in Siskiyou county which is a new county record. Populations in 18 California counties reporting were from light to severe but generally lighter than last year. In the Yerington, Nev., area, populations were above last season and controls were necessary. Brookings county, S. Dak., was reported infested for the first time and in Indiana the pest had moved eastward to the Ohio line. New Indiana county records include Switzerland, Ohio, Dearborn and Sullivan counties.

SOYBEAN CYST NEMATODE NOW IN SIX STATES

The soybean cyst nematode which was first found in this country in New Hanover county, N. C., in 1954 is now known to be in six southern states. Until 1956 the only known infestations were in the two North Carolina counties of Pender and New Hanover, but in November of that year the pest was found in a soybean field in Lake county, Tenn. Since then the nematode has been found in 3 additional Tennessee counties, 3 Missouri counties, 2 Arkansas counties, one county each in Kentucky and Mississippi and one additional county in North Carolina.

In July of this year a Federal soybean cyst nematode quarantine was invoked to regulate the movements of host materials, commodities, or anything that constitutes a hazard of spread. North Carolina has had a state quarantine and the other states have or are developing quarantines. The quarantines and regulations are designed to contain the infestations of the soybean cyst nematode to the areas where it is now known to occur.

TRUCK CROP INSECTS

Aphids were active on vegetables during late September in several widely scattered states. In Utah one or more treatments were necessary for the potato aphid on commercial and certified potato plantings in the Beryl-Enterprise area. The melon aphid was very heavy on some commercial cantaloupe fields in Major county, Okla., and in Alabama fall tomatoes were reported to have heavy aphid populations. In Delaware aphids on squash were on the increase and cucurbits were reported infested in Rhode Island. Earlier in September aphid populations on vegetables throughout New York state were

PESTS . . .

on the increase with the worst infestations in tomato fields of Chautauqua county since the late 1940's.

The tomato fruitworm, or corn earworm, or cotton bollworm was causing damage to vegetables in several states. In Luna and Dona Ana counties, N. Mex., heavy losses occurred to many fields of tomatoes where controls against the tomato fruitworm were not applied. The insect was causing damage to bean plantings in Virginia, squash in Delaware and to some extent sweetpotato vines in Oklahoma.

1956 WAS RECORD YEAR FOR BENTONITE PROD.

The quantity of bentonite produced in 1956 was the largest in the history of the industry, according to reports of producers to the Bureau of Mines, U. S. Dept. of the Interior. The production exceeded the previous high year of 1955 by 6 per cent in quantity and 7 per cent in value.

Compared with 1955 the major uses that showed increases were insecticides and fungicides 14 per cent, and rotary-drilling mud 5 per cent.

STATISTICS

PESTICIDE PRODUCTION INCREASED 13 PER CENT

The Tariff Commission recently reported that production of organic pesticides and other agricultural chemicals in 1956 increased 13 per cent over 1955 output to 570 million pounds. Despite the overall increase, however, herbicides and plant hormones as a group showed some decline.

Among the largest percentage increases were those registered by benzene hexachloride (51 per cent) and the acylic group composed of malathion, metaldehyde, sodium TCA, soil conditioners, thiocyanates and rodenticides (53 per cent). The product made in largest quantity was DDT (24 per cent of the total).

Even though production was on the uptrend, the report said sales were off nearly 5 per cent, so that stock carryovers at the end of the year were probably larger than at year-end 1955. USDA reported earlier that inventories of pesticide chemicals in the hands of basic producers and formulators at the end of the season, Sept. 30, 1956, were about 70 per cent higher than the year before.

REPORT ON BORON MINERAL SALES DURING 1956

Boron minerals sold or used in 1956 increased slightly to 944,950 short tons (gross weight) valued at $39,591,953, according to reports by producers to the Mines Bureau.

NEW HIGH IN '56 FOR SULFURIC ACID OUTPUT

United States production of sulfuric acid in 1956 reached a new high of 16,494,538 short tons, increasing 1.5 per cent over the 1955 figure of 16,254,991 tons, reports the Bureau of the Census.

About 86.5 per cent of the 1956 output was produced by contact process, compared with 85.7 per cent of the smaller 1955 total. The amount of acid produced by the chamber process continued to decline. Shipments (including interplant transfer) in 1956 totaled 9,766,185 short tons or 0.6 per cent less than the 1955 reported tonnage of 9,826,145.

Production — July, 1957

Compiled from Government Sources

Chemical	Unit	July 1957	July 1956	June 1957[1]
Ammonia, synth. (anhydrous)	s. tons	293,611	248,384	308,755
Ammonia liquor, coal & coke (NH_3 content)	pounds	2,849,907	2,114,300	2,792,854
Ammonium nitrate, fert. grade (100% NH_4NO_3)	s. tons	161,363	131,901	164,787
Ammonium sulfate				
synthetic (technical)	s. tons	80,596	81,743	91,998
coke oven by-prod. (inc. amm. thiocyanate)	pounds	159,173,005	40,474,400	155,548,474
BHC (Hexachlorocyclohexane)	pounds	**3,412,943	8,630,525	5,092,137
Gamma content	pounds	**610,746	1,435,215	840,993
Calcium arsenate (commercial)	s. tons	1,890	4,044	2,786
Copper Sulfate (gross)	s. tons	6,472	6,196	6,632
DDT	pounds	**10,484,918	11,927,462	11,023,156
2,4-D Acid	pounds	**2,907,720	———	3,061,244
esters and salts	pounds	**1,944,737	1,916,407	**1,686,123
esters and salts (acid equiv.)	pounds	**1,626,006	1,484,060	**1,351,002
Lead arsenate (acid and basic)	s. tons	———	[1]	———
Phosphoric acid (50% H_3PO_4)	s. tons	331,608	235,900	*331,083
Sulfur, native (Frasch)	l. tons	459,534	621,130	439,513
Recovered	l. tons	45,311	43,400	44,867
Sulfuric acid, gross (100% H_2SO_4)	s. tons	1,285,869	1,129,556	*1,308,571
Superphosphate (100% APA)	s. tons	162,974	136,778	*170,519
Normal and enriched (100% APA)	s. tons	73,656	[3]76,332	83,506
Concentrated (100% APA)	s. tons	76,606	45,338	68,355
Other phos. fertilizers (inc. wet-base goods)	s. tons	12,712	[4]14,281	*18,658
2,4,5-T Acid	pounds	**549,395	489,796	**603,237
Urea	pounds	66,186,819	51,566,620	71,619,423

*Revised. **Partly estimated. [1]Withheld to avoid disclosing figures for individual establishments. [2]Includes quantities for plant previously not reporting. [3]Excludes enriched superphosphate, quantities of which if added to normal superphosphate would account for less than 2 per cent of the total. [4]Excludes wet-base goods, quantities of which if added to other phosphatic fertilizers would account for less than 1 per cent of total for items except stocks. Stocks of wet-base goods would account for less than 3 per cent.

FERTILIZER MATERIALS MARKET

New York

October 21, 1957

Sulfate of Ammonia. A good export demand has been noted and stocks in the hands of the producers are not too large. The average price for coke oven material remains at $32 per ton in bulk, f.o.b. production points.

Nitrogen Solutions. Some of these materials were recently advanced in price about $2 per ton which has prompted many buyers to take their material in early.

Urea. Continued imports of this material from abroad are being made although domestic production is said to be adequate to supply the trade. No price changes noted.

Nitrogenous Tankage. Some producers report a sold up condition until after January 1 and prices remain at $3.25 to $4.25 per unit of ammonia ($3.95 to $5.16 per unit N) f.o.b. production points.

Castor Pomace. Sales are being made of domestic castor pomace at $45.50 per ton, f.o.b. production points, with a limited quantity available for sale.

Organics. Organic fertilizer materials displayed a mixed tone with some price changes noted. Blood was slightly easier at $5.50 per unit of ammonia ($6.68 per unit N) f.o.b. New York and tankage sold at $4.75 per unit of ammonia ($5.71 per unit N) f.o.b. New York. Most of the sales were made to the fertilizer trade with the feed trade showing little interest. Soybean meal was quoted at $46 per ton, f.o.b. Decatur, Ill., in bulk for October shipment and some future months could be bought cheaper. Linseed meal was easier in price and cottonseed meal was quoted at $55 per ton, f.o.b. southeastern shipping points.

Fish Meal. With fishing operations drawing to a close over part of the Eastern Coast, some producers were inclined to hold available stocks at prices ranging from $130 to $133 per ton f.o.b. fish factories for the 60 per cent menhaden fish meal. Very little imported material arrived during the past month.

Bone Meal. Sales were recently made on the basis of $62.50 per ton, f.o.b. production points for both fertilizer and feed grade bone meal and in some cases producers were sold ahead. Imported feeding grade bone meal continues to arrive at various ports in limited quantities.

Hoof Meal. Last sales made on basis of $5.75 per unit of ammonia ($6.99 per unit N) f.o.b. Chicago with demand limited to buyer's immediate needs.

Superphosphate. With such materials as triple superphosphate more plentiful, buyers had little trouble in covering their anticipated requirements. A good demand was reported, however, from certain sections for use in pastures.

Potash. A strong competitive situation has been evident in this market for some time and buyers in most cases were inclined to hold up shipments on contract as long as possible.

Philadelphia

October 21, 1957

There is still practically no activity in the raw materials market, which is about normal for this time of the year. However, there is a very noticeable lack of interest in future delivery contracts. Prices of several materials were advanced October 1, and the recent advance in freight rates tends to further increase the destination cost of all materials.

Sulfate of Ammonia. Domestic demand is still rather weak, and the export movement is also slower. Production is up somewhat and inventories are accumulating.

Ammonium Nitrate. A general price advance of $4 per ton became effective October 1, making the cost $68 per ton for the balance of this year. Then there is another advance of $4 per ton scheduled for January 1.

Nitrate of Soda. The price of both domestic and imported has been advanced $1.75 per ton. The supply is ample.

Urea. Price of the agricultural grade remains at $110 per ton, and there is presently no scarcity.

Blood, Tankage, Bone. The situation is devoid of activity, and the movement limited. Blood is quoted at $5.25 per unit ammonia ($6.38 per unit N) in the New York area, and $6 per unit ($7.29 per unit N) Chicago. Tankage is priced at $5 per unit ($6.08 per unit N) New York and $6 to $6.25 per unit ($7.29 to $7.59 per unit N) Chicago. Bone meal has sold at $62.50 per ton.

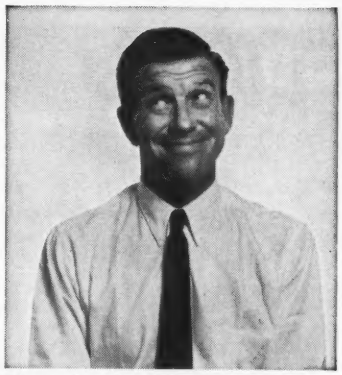
Castor Pomace. The supply is not too plentiful but sales have been made at $45.50 per ton.

Fish Scrap. Market is exceedingly dull and asking prices are $125 to $128 for unground scrap and $130 to $133 per ton for menhaden meal.

Phosphate Rock. Due to increased labor costs, prices have been advanced an equivalent of 12 cents per ton across the board. Supply is ample and movement normal for this season.

Superphosphate. Production has been somewhat reduced and stocks are declining. Movement is seasonal and prices remain unchanged at 90 cents to 93 cents per unit APA for normal grade, and 98 cents for triple.

Potash. A slight price advance is indicated, with muriate quoted at 35½ cents to 37 cents per unit K_2O. Supply is plentiful. ▲



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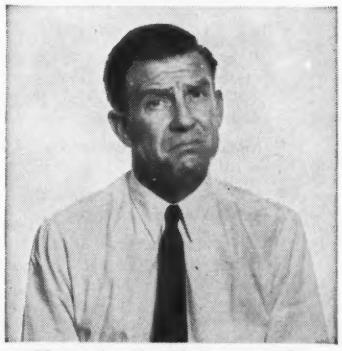

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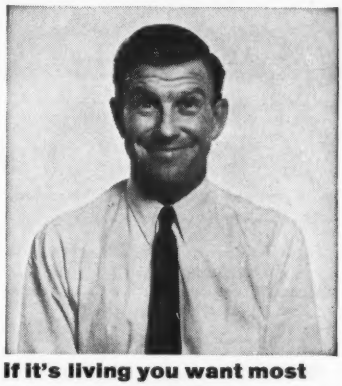
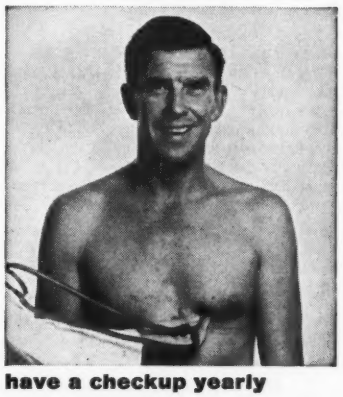


if it's living you want most



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Geigy Agr. Chems. Div. Geigy Chem. Corp. N.Y.C.

CHLORDANE
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Tennessee Corp., Atlanta, Ga.

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Monarch Mfg. Works, Inc., Philadelphia, Pa.
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MACHINERY Superphosphate Manufacturing
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NITROGEN MATERIALS—Organic
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NOZZLES—Spray
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Bradley & Baker, N. Y. C.
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Woodward & Dickerson, Inc., Philadelphia, Pa.

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International Min. & Chem. Corp., Chicago, Ill.

SULFUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying
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U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

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Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

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International Min. & Chem. Corp., Chicago, Ill.
Phillips Chemical Co., Bartlesville, Okla.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC
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Armour Fertilizer Works, Atlanta, Ga.
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Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Sohio Chemical Co., Lima, O.

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